The IRON AGE

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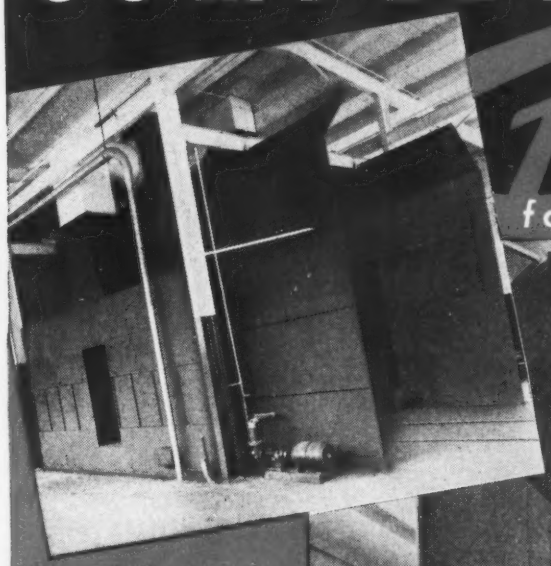

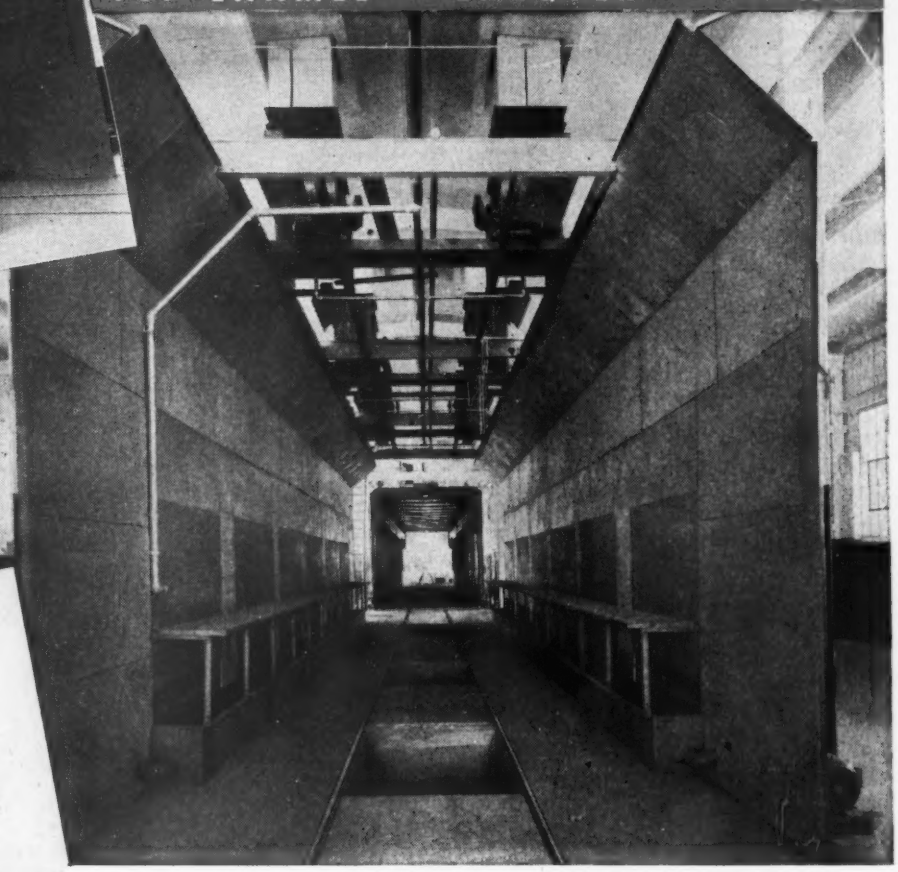

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Dilemma Germanica

THERE is a rather crazy state of affairs in Germany. It should be —but apparently isn't—the source of some concern that American policy staggers along in a kind of unrealistic welter of administrative slackness and disorder. And all this in the one section of the world where energetic and informed decisions could return maximum dividends in prestige and power.

General Clay may steadily pour out censored and optimistic reports, but Germany, and so Europe, is skating on the thin edge of catastrophe. While Americans track down a few communists at home, thousands are daily sliding onto the Marxist bandwagon in Germany amid a prevailing atmosphere of starvation, deprivation, despair and disillusionment.

Both the Americans and British have fumbled for two years with the shattered wreck of Germany. The exhausted country has spiraled downward to rock bottom and is infinitely worse off today than on the day of defeat. Some may view this trend in the light of justifiable retribution—but it's hardly smart, in terms of sheer self-interest. Conquered Germany, with a superb and intact industrial machine, could be the source of wealth to the conquerors. But, rather, it now is and promises indefinitely to be a drain on the victors' food resources and other real wealth.

The fundamentals for recuperation still are present. Germans, living like rats in wreckage, still waver between the extremism of the right or left. The American proconsul, General Clay, still can fan the economy to life, and prop the faltering spirit of democracy. To do this requires no burst of genius—but merely some elementary recognition of German economic and industrial fundamentals.

First, it is to be regretted that American administrative personnel consists of the rag-tag of bureaucratic residue from Washington. General Clay's entourage includes no production men of even mediocre ability. Better men must be induced to take on the German problem—and given power to implement their decisions.

Immediate currency reform is imperative. Both internal and external trade hang in suspended animation, partly due to constant disintegration of the value of the mark. Revaluation must come sooner or later, and the decision cannot much longer be deferred.

Much of the thinking of the original Morgenthau-Potsdam Plan period had better be abandoned. The smashing of German industrial potential may have an emotional appeal, but even the most casual observer can recognize futility in reducing a highly integrated industrial country to a rural economy. If the blast furnaces don't run there is no power for subsidiary industries, no fertilizer for the farms and no work for the people.

The confiscatory exports of Ruhr coal had better be modified. Some coal is needed to revivify the vital steel industry, which in turn can ease the starvation in essential tools for other industries and even for coal mining itself.

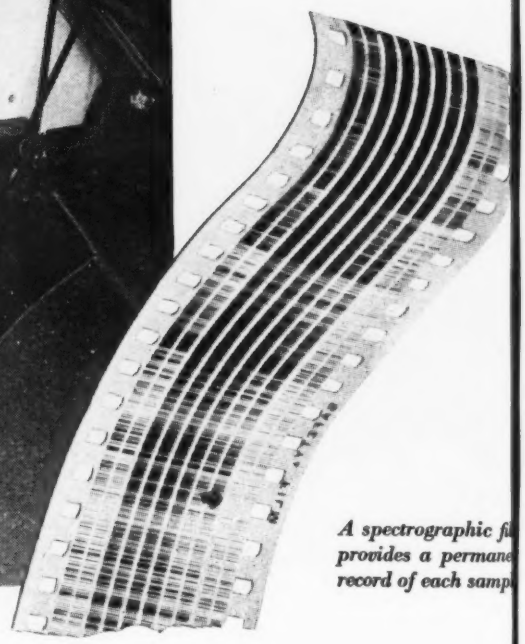
Centralized administration of British and American zones must be devised. There is need of modification of American insistence on many State governments with vague powers and a rule of unanimity. It's all very well to hark back to the American Articles of Confederation, but certain central prerogatives were needed in eighteenth-century America. Similar powers are certainly needed in twentieth-century Germany.

The complicated machinery of German exports must be renovated. Foreign loans are essential for importation of raw materials. The way must be opened for direct contacts between foreign buyers and German exporters at fixed exchange rates.

All this may raise the spectre of German exports displacing American products in certain world markets. Indeed, current miserable efforts have already faced a wave of objections. But some displacement seems far better than the present two-way outpouring of American wealth: on the one hand, shipments into Germany to sustain life; on the other, shipments of exports to many countries on dubious credit or as outright gifts.

T. W. Lippert

Examination of the spectrum emanating from the vaporization of the steel sample in an electric arc quickly reveals the chemical content of the sample.



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Spectrographic Analysis ... another Inland Routine

To check the chemical composition of the heat in the open hearth furnace as it nears the end period, samples taken from the furnace are carried by pneumatic tube to the Inland laboratories for a quick but accurate spectrographic analysis. If the metallic composition of the heat is not exactly right, this check will determine the changes necessary to bring the steel to specifications. This is only one of the many tests made with this new and useful analytic tool—tests that make possible Inland steels of uniform quality to meet your service requirements.

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► The iron and steel survey being made by the Office of Domestic Commerce, Dept. of Commerce, does not deal with controversial questions of future demand and steel capacity, department officials have again emphasized—and it may not be ready by the July 1 deadline. Only last week Commerce Dept. agents were investigating the ramifications of sheet steel distribution.

► A power electric eye to measure Magnaflux indications of welded pipe will soon be inserted in a production line and will be capable of inspecting the welds on pipe moving as fast as 100 fpm. Crews operating the inspecting machine will divert bad welds for further inspecting by salvage men.

► In desperation, a prominent consulting aircraft engineer searching for information on proportional limit values of aluminum alloys went to the largest technical book store in Chicago and offered to buy every book in stock that even mentioned the subject. He couldn't buy a single book. Neither have the producers been able to supply him with any data.

► A process designed to maintain the neutrality of chloride-base salt baths is reported to eliminate the deleterious oxides by passing a small amount of methyl-chloride gas through the salt bath. It can be used on any chloride-base salt bath operating between 1300° and 1700° F.

► No. 1 on the list of improvement projects for the British iron and steel industry is the job of raising the standard of all blast furnaces to the level of the country's newest and most efficient units.

► A new wrinkle in brazing carbide tool tips is a silver alloy paste that begins to melt at 480° F and is said to protect both the carbide tip and the steel joint area with a liquid protective film before the heat generated oxides can form. The new paste is merely painted on the prepared joint surfaces.

► Reports of large scale cancellation of construction contracts are unfounded but postponements of such orders do run into many millions of dollars. Some observers see a year to a year and a half delay before firm orders are placed for the postponed business.

► The Air Materiel Command at Wright Field has struck another blow at aviation's most formidable foe—weather. External radio aerials which pick up static in bad weather can now be eliminated in favor of exciter coils so mounted in the wing that the entire wing structure itself acts as an antenna.

► American officials responsible for rehabilitating Germany are chafing at the delay in settling reparations, pointing out that no industrialist can be expected to put much effort into rebuilding his plant until he knows whether or not it will be taken for reparations.

► Czechoslovakian officials have been trying to buy two or three Austrian blast furnaces in exchange for 400,000 tons of coal but Allied Control authorities have banned the deal.

► Development of high octane motor fuels is still under heavy wraps but substantial research progress indicates that future fuels may require engines with 12 to 1 compression ratios—almost twice the compression of present engines.

► Lack of funds will probably delay Bureau of Mines plans for a pilot plant to work on the extraction of pigment grade titania from low grade ores of which the United States is in long supply. Such a development would permit a switch to domestic ores.

► Three Italian steel plants belonging to Ilva have received a government reconstruction loan equivalent to $8.8 million.

► Two powder metallurgy developments promise to boom industrial use of metal powders. One is precast powders, the other hot pressing. While the latter is still in the experimental stage it appears to be the means of fabricating many of the precast alloy powders at pressures far below those now required by cold pressing methods.

► Bessemer converter popularity is on the increase. Great Lakes Steel has two 25-tonners on order and National Tube just signed a contract for four. Another is en route to Mexico, another to Brazil and a Pittsburgh steel company has a large side blown unit under way.

Duplexing Low Carbon

The production of iron in the 1.20 to 1.45 C range in a duplexing setup involving a basic cupola and an acid electric furnace is described in this article. This arrangement, designed to provide 180,000 lb of hot metal per 9-hr shift for the continuous pouring of automotive parts, is said to result in a high degree of uniformity of composition and temperature and with a sulfur maximum of 0.08 pct. The authors also describe an unusual chute arrangement for charging the electric furnace and the use of acid monolithic hearths and water cooled roofs.

IN order to fulfill the requirements of the production foundry, duplexing methods have become the established practice and various combinations of furnaces are in successful operation. The choice of a combination, from the technical viewpoint, depends primarily on the carbon range of the metal which is to be produced.

This article describes a duplexing unit, cupola and electric arc furnace, which would normally be used for a carbon range of 3.5 to 2.0 pct but, owing to availability of equipment, was adopted for the range of 1.20 to 1.45 pct C. This deviation from standard practice necessitated the introduction of certain practical and technical innovations which in themselves have proved major contributions to the establishment of a very successful melting unit.

Fig. 1 shows the layout of the two furnaces. The cupola is of standard design, 60 in. OD, lined to 42 in., and is mechanically charged. Continuous tapping is employed, using the arrangement shown in fig. 2.

It will be seen from fig. 1 that the cupola is in close proximity to the electric furnace and that the cupola metal is delivered directly from the cupola runner to enter an inlet in the side wall of the electric furnace. In this manner, no intermediate handling of the metal is necessary and the loss of heat due to transfer is reduced to a minimum.

The electric furnace is a three-phase, three-electrode, acid-lined type with a 6000 kva transformer and is lip tilted, the capacity of the furnace being 40,000 lb. Cold charging is performed in two ways, first by a movable chute run into position through the rear slagging door and fed by a slat conveyor (not shown in fig. 1), and second by an arrangement of a chute and roof door. The roof door in the electric furnace (fig. 1) takes the form of an unlined, water-cooled jacket sealing a 2-ft diam hole in the furnace roof into which the end of a tubular charging chute may be lowered. The roof charging chute is raised and lowered by an electric hoist and is fed from the cupola charging floor (fig. 3).

Metal from the electric unit is required to supply a continuous molding system for the manufacture of cast alloy crankshafts (analysis is 1.25 C, to 1.45 pct C, 0.85 to 1.10 pct Si, 0.70 to 0.90 pct Mn, 0.08 pct max S, 0.06 pct max P, 1.50 to 2.00 pct Cu) and other components in a similar range of composition. The method of preparing the initial bath, prior to the commencement of pouring, is to cold melt 25,000 lb of steel scrap, charged by the rear chute, and when dead melted, tap the cupola and raise the volume of metal in the bath to 42,000 lb with cupola carbon content of the bath within the required range 1.20 to 1.45 pct. Finishing alloys are then added to give a final adjustment of the composition, the bath temperature corrected and pouring is commenced.

The problem of maintaining continuity of melting and pouring and at the same time reducing the carbon content of the cupola metal from 2.70 to 1.35 pct has been accomplished by obtaining a careful balance between input and output. Molds are delivered to the pouring station to give an hourly output of 18,000 to 20,000 lb, and melting composition and temperature control must proceed simultaneously with continuous output. There, a well defined sequence of operations is followed. The furnace is tapped into a 1200 lb capacity barrel type ladle which in turn supplies the pouring shanks. During the pouring of this quantity, the roof door is raised and the roof chute lowered, each by remote control, both being motor operated. A 600-lb charge of small steel scrap, together with the required quantities of ferrosilicon, ferromanganese and copper,

TABLE I

Stabilized Dolomite Bricks

Chemical Analysis (typical sample)

SiO_2 15.1 pct, Fe_2O_3 3.2 pct, Al_2O_3 2.0 pct, CaO 39.1 pct, MgO 40.6 pct.
Hydration resistance—withstands 24 hr boiling in water.
Porosity—20 pct.
Bulk density—2.71 g per milliliter (169 lb per cu ft).
Specific gravity—3.39.
Cold crushing strength (tested on end)—+ 8000 lb per sq in.
After contraction (2 hr at 2730°F)—0.4 pct.
Refractoriness-under-load (25 lb per sq in. maintained 2 hr at 2730°F)—5.0 pct subsidence.
Refractoriness-under-load (50 lb per sq in. rising temperature)—initial softening 2660°F; rapid softening, 2750°F; failure, 3002°F.
Thermal expansion (68°F to 1832°F)—1.3 pct.
Thermal conductivity (1292°F mean)—15.2 Btu per sq ft per in. per hr per °F.
Specific heat—0.25.

Alloys • • •

By E. S. RENSHAW and T. FOLEY
Ford Motor Co., Ltd.,
Dagenham, England

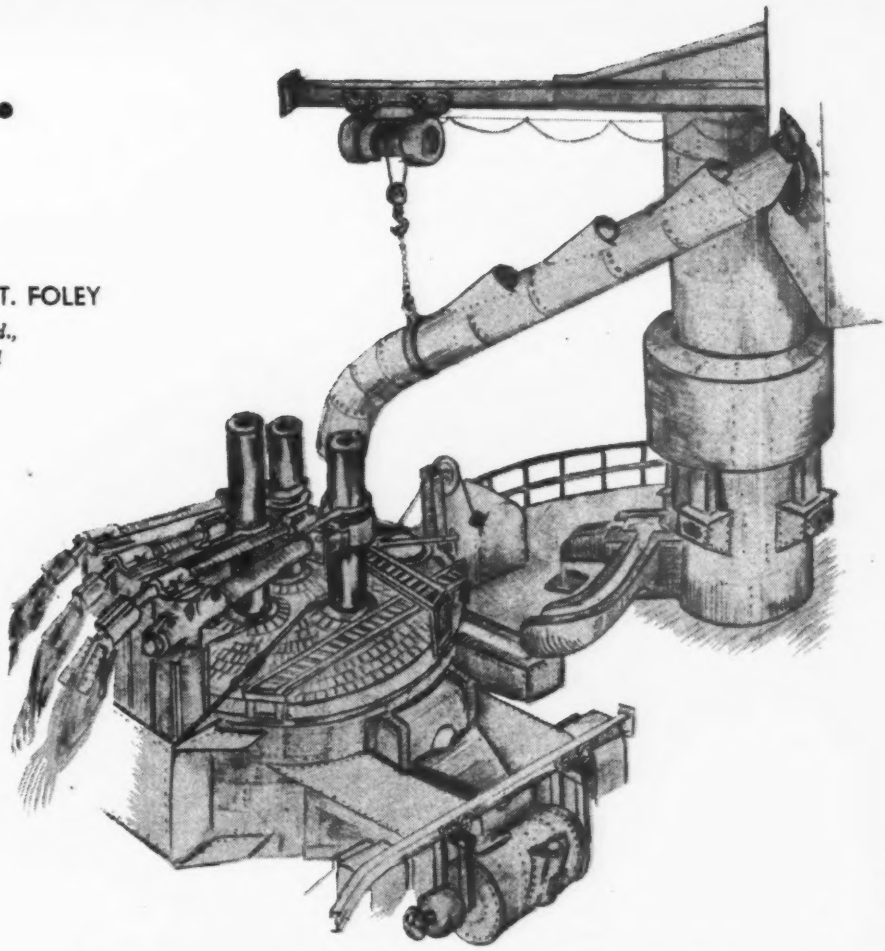

FIG. 1—Arrangement of basic cupola and acid electric furnace used for producing low carbon alloys. Chute arrangement permits charging of electric furnace through a hole in the furnace roof.

previously weighed into a tilting bucket, is added down the chute. The latter is then raised, the roof door closed and the furnace is ready to deliver a further 1200 lb of metal to the barrel ladle.

This operation takes 3½ min and the cupola is operated to give 600 lb of molten metal in this period, which is a melting rate of 10,000 lb per hr. In other words, the delivery rate is 1200 lb of metal per 3½ min, replaced in this time with 600 lb of steel scrap and alloys and 600 lb of cupola metal and the whole process becomes continuous, it being unnecessary to temporarily take off the current for additions or to raise the electrodes. By adding frequent small quantities of steel scrap with a continuous stream of cupola metal and maintaining a large bath and high dilution factor, a perfect mixing is obtained with a minimum fluctuation in bath temperature.

Slagging off the bath is carried out each hour and is made a quick operation. Temperature checks are taken at each tilt of the furnace by optical pyrometer and the man responsible for this checking works in close contact with the furnace operator who in turn controls the electrical input accordingly. Bath samples are taken at 10 min intervals for chemical analysis and the process, standardized in the manner outlined above, gives remarkable uniformity of composition in the production of 180,000 lb of metal in a 9 hr shift.

TABLE II
Melting Data

CUPOLA CHARGE		
Shop return scrap	1300 lb	Current consumption 380 to 410 kw-hr per ton
Ferrosilicon (45 pct)	12 lb	
Limestone	80 lb	Electrode consumption 12 to 15 lb per ton
Fluorspar	20 lb	
Coke	144 lb (9:1 ratio)	Total metallic melting loss, 7 to 9 pct

As previously mentioned, deviation from standard practice involved special consideration being made to various points of technique relating to refractory problems and sulfur control. In the first place, the normal acid-lined cupola was in use and the control of sulfur content presented a problem in that the equipment did not lend itself to the application of soda ash treatment. The metal temperature in the barrel receiving ladle is 2800° to 2850°F, this being too high for effective soda ash desulfurization as soda ash at these temperatures is subject to volatilization. By resorting to ladle treatment of the cupola metal as an intermediate process between the cupola and electric furnace, operating sequence would have been interrupted and loss of metal temperature involved. The basic cupola process was, therefore, adopted as a result of previous experimentation, details of which have been previously reported[1].

[1] *See "Basic Cupola Process for Desulfurization," Foundry Trade Journal, June* 24, 1943; *also "First Report on the Basic Cupola," Proceedings, Institute British Foundrymen,* 1943-44.

Using the acid lined cupola with the coke available, the average sulfur content of the cupola metal was 0.14 pct. The sulfur content of the metal from the basic lined cupola can be controlled and the furnace is usually operated to give an average of 0.05 pct. The

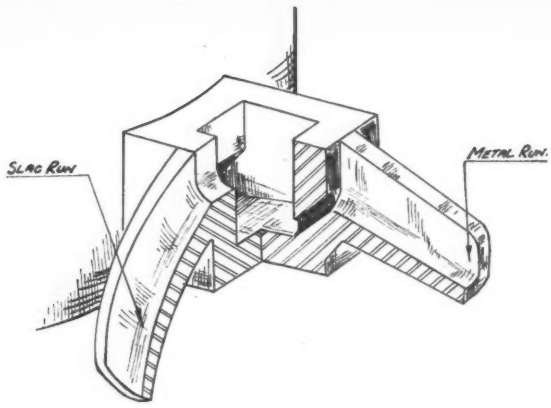

FIG. 2—Cupola spout arrangement for continuous tapping.

cupola is lined to a height of 4 ft 6 in. above the tuyeres with proprietary stabilized dolomite bricks (see table I), the remainder of the lining upwards being bricked with the normal grade of firebrick. For the continuous tapping box, monolithic lining is employed and is prepared by ramming stabilized dolomite cement of ramming consistency using a metal former of suitable design and standard dimensions. Daily repairs to the well and melting zone are made with stabilized dolomite cement mixed with water to patching consistency and the usage is, approximately, 50 lb per ton

FIG. 3—Charging floor entrance to electric furnace charging chute shown in fig. 1.

of metal melted. Partial repair to the brick lining is required after a 6-week period of operation.

Similar melting procedure is carried out with the basic lining as when using the acid lining, care being taken to avoid any excessive oxidizing conditions for, under such circumstances, sulfur will revert from the slag to the metal. Table II gives a typical cupola charge, the flux portion being suitable for a coke containing 11.0 pct ash and 1.0 pct sulfur. The limestone portion may be varied according to the coke quality and to the tendency of the coke to give high sulfur pickup, the slag basicity being increased in poor quality fuel. The following is a representative analysis of the basic cupola slag: SiO_2 30.0 pct, CaO 44.0 pct, MgO 14.0 pct, Al_2O_3 8.74 pct, FeO 0.52 pct, S 1.08 pct and MnO 0.83 pct. Due to the higher basicity of this slag, silicon loss is greater than in the acid cupola, 20 pct being the loss allowed in computing mixtures.

Electric Furnace Refractories

It will be realized that conditions which exist in the electric furnace are particularly arduous on the refractory lining, and while this caused some concern in the early days, longer working hours with corresponding shorter repair time during the war, enforced certain changes in refractory technique. Continuity of melting, consistent with maintaining a high bath temperature of 2900° to 2930°F, compels a continuous high electrical input with the result that the furnace hearth is subject to intense local heating. Silica brick hearth was used in the early operations, as in normal duplex methods this is quite satisfactory. However, the maximum life of this hearth was 1 week and a major repair was required each weekend with considerable nightly patching. Penetration of the metal between the brick joints was one reason for failure and a monolithic hearth was indicated although the fritted sand type did not inspire confidence. Because of these considerations, a new technique of hearth preparation was ultimately evolved and is described herewith.

Acid Monolithic Hearth

This new technique involves the use of siliceous materials suitably prepared for ramming by a method which produces the maximum ramming density and freedom from porosity. Scrap or discarded silica roof bricks are crushed and ground in a suitable mill, the grinding being so controlled as to give a grading of particles which, when rammed, will give the maximum packing density. There is an optimum grinding time for each type of mill, at which the packing density of the milled product reaches a maximum. Further grinding tends to reduce the packing density.

It was found that with the mill in this plant the maximum packing density of 1.74 g per milliliter is reached with 12 min milling, and these figures should at first be determined for any individual type of mill. Greater importance is attached here to the packing density than the grain size, but the average grain size of our material is approximately:—

On 5 mesh	4	pct
8 "	10.5	pct
30 "	25.0	pct
85 "	16.0	pct
150 "	14.5	pct
Through 150 "	30	pct

(British Standard Spec. sieves)

The standard test used for the packing density determination is as follows:

> **250 g are taken and given 50 drops with the AFA rammer, as in the usual sand testing procedure. The test piece produced is accurately measured and the grams per milliliter calculated.**

In the formation of the hearth the prepared material is applied in successive layers, each layer being hand rammed by means of rammers suitably designed to give maximum compacting of grains. For the initial ramming, 1 in. diam rammer heads are used which gives the correct grain orientation. This is followed by a 2 in. diam rammer head, finally the 4 in. square rammers are used to complete the compaction. Preliminary burning in is not essential if time does not permit and the total installation time is no greater than that required for a brick construction.

The first hearth to be installed by this method gave 18 months life and undoubtedly, with occasional patching, can be made to last indefinitely. Daily patching has been reduced to a negligible amount and the method has become standard practice for all electric furnaces as also for hot metal receivers for gray iron production.

Water Cooled Roof

The conditions to which the electric furnace roof is subjected are more severe than in normal practice due no doubt to the frequent opening of the roof door, causing an upward rush of heat. The thickness of the roof lining is 12 in. and certain portions of the brickwork would be reduced to 4 in. by fusion after a week's production of 450 tons. Water cooling methods were considered in order to reduce the erosion and experimental work was carried out on the roof of a 1-ton batch melting furnace of similar type. In order to form some conception of the heat losses involved in roof cooling, it was decided to construct a roof entirely in the form of a water jacket, eliminating all refractory material.

The jacket, fabricated from 0.375-in. thick sheet steel, had a diameter of 5 ft and a depth of 3½ in. Baffle plates were welded at certain positions to insure efficient water circulation. The electrode holes were fitted with refractory sleeves leaving sufficient clearance for the electrodes and the whole jacket rested on the furnace wall, as in the case of the brick roof. About 100 heats were melted in this furnace using the water jacket roof, and while, for practical purposes, it was quite satisfactory, the increase in current consumption averaged 10 pct.

Water Cooling Applied

Although the saving in refractories would not be offset by the added cost of current, the experiment gave confidence in possibilities of water cooling and the experience has been applied to the major unit.

As previously stated, the roof door on the duplexing unit takes the form of an unlined water jacket which has an indefinite life and suffers no distortion. The roof charging hole is surrounded by a water cooled frame and the brickwork between the electrodes at the apex of the roof has been replaced with a water jacket extending the full thickness of the roof. Similarly, a section of the brickwork between the electrodes and the run of the roof at the mast side of the furnace has been replaced by a further water jacket. In this manner, the roof life has been doubled and the principle offers further scope for extension.

It will be appreciated that the method of duplexing low carbon alloys, described in this article, is somewhat unorthodox and for this reason certain improvisations have had to be applied. However, these improvisations have become established features and could, without doubt, be applied to other melting units.

A New Swedish Iron Powder

THE availability of a new, high-quality, hydrogen-annealed iron powder, which combines low cost with high metallic iron content, low oxygen, low carbon and low silica contents, is announced in *Iron and Steel*, April 1947.

The high degree of purity in the new grades of Swedish sponge iron powder produced by Hoganas-Billesholms, Sweden, is said to be superior to any iron powder previously produced. The analysis of this new type powder is indicated in table I under the grade name M. H. Of the two grades listed in table I, the M grade is the present-day ordinary grade for all purposes while M. H. is hydrogen annealed, has exceptionally low oxygen content and is especially suited for all powder metallurgical uses except bearings.

The provision of a hydrogen annealed Swedish sponge iron powder is said to be an entirely new departure and the importance of this step is gaged from the physical properties listed in table II.

TABLE I

Iron Powder Analyses

Quality	M. Grade	M. H. Grade
Iron (metallic)	97.5 pct	98–98.5 pct
Oxygen	1.2	0.7
Sulfur	0.01	0.01
Phosphorus	0.006	0.006
Carbon	0.01	0.07
Silica	0.2	0.2

TABLE II

Physical Properties of Grade M. H. Iron Powder

	Pressure Tons per sq in.	Density	Hardness	Tensile Strength, Psi	Elongation, Pct
Unannealed	30	6.06	49.51	6.4	8.6
Annealed	30	6.51	71.71	10.8	9.36
Unannealed	50	6.50	69.69	11.1	9.4
Annealed	50	7.02	85.85	12.6	12.6

Metal Powder Meeting To Feature Product Exhibit

SUPPLEMENTING its usual technical presentations on powder metallurgy with an exhibit of 14 manufacturers of metal powders, metal powder products and equipment, the Metal Powder Assn. will hold its third annual spring meeting on May 27, 1947, at the Waldorf-Astoria Hotel, New York.

Considerable interest has been indicated in the coming session, as evidenced by the fact that the advanced registration already exceeds the total registered attendance at the meeting held last year. It is significant to emphasize that the metal powder industry is currently undergoing an extensive expansion, particularly in iron powder. From a present-day production rate of approximately 2500 tons iron powder per year, pointed out by Patch (see p. 64), to an estimated production rate of 12,000 tons for the year 1948 as indicated by Sachse (see p. 62), represents a substantial increase. This is due to a combination of (1) the entry of several newcomers into the powder metal field as well as (2) expansion activities of several of the old-line companies.

The economic phase of powder metallurgy will again assume an important position in the technical discussions, in view of increased powder capacity and new technological advances. In view of the emphasis being placed on the increase in iron powder output two accompanying articles entitled "Economics of Iron Powder Manufacture," by J. F. Sachse, Chief Metallurgist, Metals Disintegrating Co., Elizabeth, N. J., and "Powder Metallurgy—Process or Product?", by E. S. Patch, Patch & Talmage, Stamford, Conn., are intended to serve as focal points around which discussions of an economical nature are sure to materialize. Two important technological advances, production of precast powders and utilization of hot pressing, are discussed by G. J. Comstock and J. D. Shaw (see p. 67).

Arrangements are also being made with the Army Air Forces to show a sound motion picture illustrating the part played by powder metallurgy in aviation.

The meeting is open to nonmembers as well as to members of the Metal Powder Assn. There is to be no charge for admission to the exhibits, although a registration fee will be required for attendance at the technical sessions.

Exhibits will open and registration will begin in the hotel's Basildon Room at 9 a. m. Meetings will be held in the adjoining Jade Room and a luncheon for all registrants will be given in the Astor gallery.

Exhibitors at Third Annual Metal Powder Meeting

American Metal Company, Ltd., New York
Callite Tungsten Corp., Union City, N. J.
Federal-Mogul Corp., Detroit
General Aniline & Film Corp., New York
Charles Hardy, Inc., New York
Kux Machine Co., Chicago
Metals Disintegrating Co., Inc., Elizabeth (B), N. J.
Metal Hydrides, Inc., Beverly, Mass.
National Smelting Co., Cleveland
New Jersey Zinc Sales Co., New York
Plastic Metals Div., The National Radiator Co., Johnstown, Penna.
F. J. Stokes Machine Co., Philadelphia
The Wel-Met Co., Kent, Ohio
Metals Refining Co., Division of The Glidden Co., Hammond, Indiana

A TYPICAL metal powder establishment is the Elizabeth, N. J., plant of Metals Disintegrating Co., Inc.

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Metal Powder Assn. Technical Program

9:00 A.M.

Registration begins; Exhibits open. Basildon Room.

9:30 A.M.

Welcome by the President, H. E. Hall, and introduction of Program Committee Chairman, F. H. Mulligan.

9:45 A.M.

Stainless Steel Powder, John D. Dale, Charles Hardy, Inc.

10:30 A.M.

New Developments in the Production of Metal Powder Parts, E. E. Ensign, Ford Motor Co.

11:15 A.M.

Cost Calculations in the Production of Powder Metallurgy Parts, Dr. Henry H. Hausner, Consulting Engineer.

12:45 P.M.

Luncheon, Astor Gallery.

2:00 P.M.

Sound motion picture, **Postwar Powder Metallurgy**, produced by the Army Air Forces.

2:30 P.M.

Panel Discussion of Postwar Powder Metallurgy.
Chairman, R. P. Koehring, Moraine Products Div., General Motors Corp.

PANEL

Apparatus for Air Classification of Metal Powders, E. C. Truesdale, New Jersey Zinc Co.
Bearings, Bushings and Allied Products, A. J. Langhammer, Amplex Division, Chrysler Corp.
Copper-Lead Bearings from Metal Powder, E. R. Darby, Federal-Mogul Corp.
Electrical and Electronic Components from Metal Powders, E. I. Shobert II, Stackpole Carbon Co.
Metal Powders as Pigments, Ernest Scheller, Metals Powder, Inc.

4:30 P.M.

Closing remarks by the chairman, board of directors, P. E. Weingart, American Metal Co.

Economics Of Iron Powder Manufacture

By J. F. SACHSE
Chief Metallurgist,
Metals Disintegrating Co., Inc.
Elizabeth, N. J.

A down-to-earth discussion in which the author analyzes the factors that influence the economy of the iron and steel industry as compared with the iron powder industry is presented herein. Existing and projected iron powder production capacity, both domestic and foreign, are discussed and production figures are cited to indicate why a "good 5¢ powder" is not available to fabricators of iron powder products.

IRON has not yet achieved the pre-eminent position in the metal powder industry that it enjoys in the field of cast and wrought metals. It is surpassed in tonnage production by at least three metals; zinc, copper and aluminum (byproduct or scrap accumulation of chips, borings, dusts, and the like, are not included in any references made to the metal powder industry, but only those metallurgical operations that are performed to produce metal powder as final product). There are reasons why other metal powders exceed iron powder in tonnage consumed. Some have to do with the nature of the metals; one is the existence of byproduct iron whose impurity is tolerated by the consumer because of the cheapness and availability of the byproduct. Another reason is said to be the cost of metallurgical grade iron powder, currently 8¢ to 12¢ per lb. It may be of interest to discuss why iron, which is thought of as being so inexpensive in cast or wrought form, costs so much more as a powder.

The dimensions of the American iron and steel industry are well recognized and many are familiar with the actual production units that constitute it. The blast furnace, the byproduct coke ovens that supply it, and the lake ore freighters that move its raw materials, are familiar sights. Our present industrial economy has been based largely upon iron and steel produced in such large-scale equipment. One must realize that it was not always so and that the business is old, even in its modern aspects, in fact some 80 years old. Its initial great steps of expansion resulted from the increase in size of blast furnaces, open hearth furnaces, bessemer converters and the like, only up to a certain point. Expansion beyond this was through adding more units of like equipment which experience indicated had reached optimum size for economical production. The fact that demand was able to support many such optimum-sized units provided a fortunate flexibility to the industry and enabled the erection of facilities at points dictated by proximity of raw materials or markets. Such is the background against which the blast furnace industry, with over 65 million tons annual capacity, has grown. Even this is not the full extent of the iron and steel industry, because steel producers have long been accustomed to utilize collected scrap steel or process revert material as part of the furnace charge. As a matter of fact, the steel-producing capacity of the industry is almost 50 pct greater than the capacity of the primary iron-producing industry, or 95 million tons annually. In the year 1945, the 67 million ton capacity of the primary iron industry was in 243 furnaces, 241 of which were producing coke pig iron. Their average capacity is therefore slightly over 800 tons per day per furnace.

The following figures for the iron powder industry are not as accurate as the above statistics, but are composed of the best estimates that can be made of existing capacity and of published statements as to capacity currently being installed or just being brought into production. By such a combination of data, a figure just under 20,000 tons per year is arrived at as being the probable capacity of the iron powder industry in 1948. This capacity includes the stated powder capacity of the best-known foreign source of iron powder, or 8000 tons per year. This

foreign plant has a capacity of 30,000 tons per year for production of both cake and powder. It has been previously stated[1], however, that all of the 30,000 tons capacity of the sponge plant could be utilized for powder manufacture. If this were so and occasion required it to be done, a total world capacity of iron powder would be approximately 40,000 tons per year. Installed and projected American capacity will therefore be slightly greater than half of the world total. If the entire foreign capacity were used to produce powder, rather than only 25 pct, as at present, existing and projected American capacity would be but one-fourth of the world total. The existing and projected American capacity of about 10,000 tons per year is divided among ten plants, over half of which are now producing commercially, hence the average capacity of the American powder plant is approximately 3 tons per day. Probably none of those plants has a capacity in excess of 10 tons per day.

[1] THE IRON AGE, *Sept. 26, 1946, p. 114.*

Capital Cost Influences Price

An important factor influencing the price of iron powder is the capital cost per ton of capacity. Processes and raw materials vary, but one gathers, from published references, that projected plants are mostly of 5-ton per day capacity and are being installed today for a low of $250,000 and a high of $1 million.

This article does not presume to be an exhaustive analysis of steel company finances, but the annual report of a large integrated factor makes interesting reading. This shows a depreciated capital cost per ton per day of about $7000, the equivalent undepreciated figure being about three times greater. By comparison, the lowest iron powder plant capital cost reported above is $50,000 per ton per day and is due, in large part, to the small capacity. It is believed that iron powder prices will not be in the proper hoped-for relation to other finished iron and steel products until 100-ton per day units are possible. Individual iron powder producers cannot be expected to make the ten-fold capacity increase without the aid of firm contracts for the product to justify such an extrapolation beyond present proven demand or even beyond optimistic predicted demand.

The manufacturers of iron powder believe that some users are unconsciously conditioned in their thinking by the relatively low prices of finished steel shapes, rails, plates, etc., forgetting the fact that iron and steel prices are the result of production on a vast scale and in production units which have been built to optimum capacity. When one states that a 5-ton per day iron powder plant is not the most efficient size, one does not speak of technological efficiency alone. It is meant, as well, that the output of such a plant is a very small divisor when applied to overhead items. For example, an iron powder plant needs a superintendent and a blast furnace needs a superintendent, but the per ton cost of the superintendent's wages is 160 times as great in the iron powder plant of 5 tons per day capacity as it is in the blast furnace plant of 800 tons per day capacity.

It was mentioned previously that the modern steel industry is about 80 years old, but in the year 1867, total iron and steel production in the United States was 22,000 tons. This is not meant to imply that, from here on, the iron powder industry will grow at the same rate, and that 80 years from today 100 million tons of iron powder will be made annually. A comparison of projected 1948 world production of iron powder of 18,000 tons with the American iron and steel output of 22,000 tons 80 years ago indicates, better than any argument on the part of the iron powder manufacturers, why a good 5¢ iron powder is not a forseeable commodity as yet.

Reference was made to the blast furnace because it is an essential unit in the iron and steel economy, and not because the author believes that iron powder and pig iron are at equivalent stages of completion with respect to the finally fabricated iron or steel article. Metallurgical iron powder is more comparable to cold-finished bar stock, body sheet, or comparable material. These require machining, forming, drawing and finishing operations for completion and, in this regard, iron powder is no different. In one sense, the fact that turnings or trimmings are not generated in its use even adds to its stature as the equivalent of finished steel.

Powder Costs Compared With Steel Composite

Annual average figures on composite pig iron and composite finished steel prices are published in various sources. These figures are extremely illuminating and show that the ratio of the price of composite finished steel to the price of composite pig iron has been remarkably constant over the years since 1897 when the composite finished steel price was introduced. Expressing composite finished steel price as a percentage of composite pig iron price, one can see that in only 3 years of the period 1900 to 1923, was the composite finished steel price less than 200 pct. From 1923 to the present, the low was 217 pct; during the OPA years, 220 pct; the average for 1923 to 1941 was 252 pct. Certainly competition had opportunity to function in the last-named period and there were several years in which buyers had things all their way. We have come, as a nation of steel consumers, to accept this markup over primary iron as an incontrovertible fact, even in an industry capable of producing 90 million tons of steel a year. Today's $40 pig iron is going to mean a composite finished steel price figure near $100. Are not the consumers who are looking for iron powder at that price, asking too much of an industry that is not even as large as the steel industry was in 1867?

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Powder Metallurgy

The favorable economic aspects of the use of metal powder products, from the standpoint of the consumer, as compared with other processes, are forcefully emphasized in this thought provoking article. A new approach to powder metallurgy is presented, whereby the consumer is also considered in the role of producer, in much the same manner as in other processes such as automatic screw machine, grinding and heat-treating operations. In other words, according to the author, powder metallurgy should be considered a process rather than a product, and must be established as a production-line factor, if the metal powder industry is to expand to its potential capacity.

PROBABLY no infant industry has received the gratuitous attention of the technical press to the extent that has been accorded sintered powder metallurgy as applied to the making of parts. Articles, charts, theoretical papers, symposiums, and even books, have heralded the promotion of this process, and to those who have been enthusiastic over the possibilities, its slow development has been a real disappointment. Parts having physical properties of the most unusual character have been discussed, but little is told of the actual application in the American economy. But, with all of this nourishment, the infant just has not grown.

Production-wise, compared to the hopes and the anticipations of its sponsors, the art has made only a most minor appearance on the scene, even in the oldest application, bearings. True, billions of pieces have been made—largely oil-impregnated bushings—but even in this earliest and most-favored field, total usage is but a small fraction of the parts made by other processes. This is a vast nation, with millions of homes and cars and telephones—all made up of myriads of metal parts—but few of them are made from powder metals.

Total usage of copper and iron powders in the United States is difficult to evaluate exactly. The majority of domestic producers, however, submit monthly shipments figures to the Metal Powder Assn., and these probably reflect 90 pct or more of domestic usage in sintered applications, so far as copper is concerned. Iron figures must be increased by importations (largely from Sweden) which can be roughly estimated. Based on these figures, total production (approximately equal to usage, with importations estimated) shows estimated monthly quantities of 700 tons of copper powder and 150 tons of iron powder, used in the manufacture of bearings and parts for months for which figures are available (December 1946 to February 1947). These quantities do not include friction materials, nor applications other than mechanical parts and bearings.

Electronic cores, for instance, are widely used in the radio trades, but they are not sintered and little is heard of them publicly. Average monthly production by American producers during the first 8 months of 1946 was, however, 88,528 lb of iron powder for such magnetic cores, as compared with 210,779 lb for bearings and bushings. Considering the much higher price per pound of the materials used in the radio trades, it is more than likely that the dollar value of shipments for such unheralded purposes was beyond that of the much discussed sintered trade.

The value of the consumption shown, for bearings and articles, can be estimated at perhaps $1.00 per lb in the case of the cuprous metals, and around 70¢ per lb for the ferrous products. On this basis the value of sales in the fields, bearings and parts, would amount to perhaps $1,640,000 per month and of this total only $240,000 represents estimated sales of sintered iron parts. This is surely an infinitesimal part of the total value of similar parts made by other processes, indicating some fundamental flaw in either our knowledge, our appraisal, or our practice.

When a process that appears to have the economic value that powder metallurgy offers is able to use only a few carloads of iron powder a month, in a country with our widespread metal usage, there certainly must be something wrong somewhere. The publicity given the sintered development must have been ten or more times that given the insulated product from which are made electronic cores—and yet the sales volume of the latter material is large, if not larger. One reason for this is perhaps the fact that there is little competition of other materials in electronic applications. In the general-parts trade, however, the products of powder metallurgy are in competition with the field and it is the author's firm

—Process or Product?

By EARL S. PATCH
Patch & Talmage, Stamford, Conn.

TYPICAL metal powder parts that the author claims can be made by the consumer at costs considerably less than production of these same parts by other manufacturing methods.

conviction that the failure to achieve real production importance is due largely to the fact that we have considered it to be a *product* rather than a competitive production *process*.

Promotion and development of this field have been largely in the hands of those who want to *sell* parts —at a profit, necessarily—in competition with parts made by conventional processes largely in the potential customer's own plant. There is about as much sense in this as there would be in expecting that all centerless ground parts have that operation performed only in the plant of the grinder manufacturer.

It is an unusual case indeed in metalworking when any new process can reduce the cost of the old method by 30 or 40 pct. By our present and general methods of fabrication and distribution, such savings—and they can often be made by this process—are dissipated, and as a result the potential use of the powder process is reduced accordingly. And, since the greater portion of mechanical parts is made from iron or steel, the real competition must generally lie in that area.

Under this existing system the final figures are usually a comparison of *cost*, in the customer's plant by conventional processes, against *price* quoted by a contract manufacturer. This price must include the markup that is necessary to absorb the high costs of selling and administration and promotion that only by good fortune are of advantage to the one man who is being asked to pay the bills. It cannot help but be true that under these conditions the comparison usually shows cost to be lower than price, and a potential and perhaps economical use of powder metals is put aside. Until recently, such comparisons were the only ones made, and in the light of them it is little wonder that many manufacturers have considered the whole process an overtouted piece of propaganda. That powder parts are too expensive is an oft-repeated story, and a general one, but comparisons of *cost* against *cost* would tell another tale.

As long as manufacturers make the parts they require in their own plant, the price of competitive purchased parts must generally be above his costs. If this were not so, our large manufacturing institutions would still be assembly plants only, and generally they have become large by integration. Every machine toolmaker relies for a large part of his sales on the user making for himself parts that were once purchased on the market, and this appears to be the general path followed by industry.

Powder Metallurgy a Process, Not a Product

Machinery, materials, and, with some limitations, manpower, are available for a widespread application of the technique on the production line. It has been done most successfully in many plants, and is now being set up in others. In fact one of the largest single users of iron powder today is a farsighted producer who has substituted it for iron castings in his production—and is, of course, making the parts in his own plant.

The thesis that the large scale advancement in the use of powder metals must come in users' own plants may be buttressed by actual examples. One plant, producing parts for toys, shows savings up to 40 pct as against competitive prices of parts made by custom makers. While it is true that in this case the technical requirements are not too tight, the fact remains that the parts so produced are satisfactory, and that the cost and supply position of the maker is considerably enhanced.

Another case is that of a radio manufacturer now making his own electronic cores from iron powder bonded by a resin. Savings of 40 pct on the com-

petitive cost are being made, quality is reported as being better than on purchased parts, and the savings alone will offset the cost of equipment within a few months. In fact, in this field alone—largely unheralded yet comparatively very important—three of the five or six largest users are now making their own parts, and this field is technically perhaps more complex than is the sintering process.

Thinking has been along the lines of the mystery and the romance of buying parts from custom makers, and this thought has been more or less consciously built up. A good example of this feeling was exhibited in a plant recently visited.

For 10 years this plant has been buying (at a very satisfactory profit) millions of small bearings and parts annually. The designs have not been changed in almost 10 years. In an adjoining department, a typical briquetting machine such as is used in powder metallurgy had been installed for making ceramic parts. It was, in fact, identical with the machines used for making the small bearings used next door, and it was installed because it could reduce the costs of the parts, even though it operates only half time.

Small Capital Investment Cuts Costs

For equipment costing not over $3000, this manufacturer could have installed sufficient sintering capacity to have taken care of his production, and could probably save in lowered costs the entire equipment investment within a month or two. His operators could be trained in a short time, and he would have had a nucleus of a growing cost-saving operation.

Surely the same mind that promoted the buying of a most-modern high production briquetting machine at a cost of $6500, more or less, could be expected to see the advantages of a reasonable extension of its use to the metallurgical field. A sintering furnace, not unlike those in the heat-treating department, would have rounded out a reasonably complete powder metal development.

In making applications of powder metal parts, relative costs are of course the most important element in most cases, excepting when the properties available in products made by this method are otherwise unobtainable. A clean-cut comparison of powder metallurgy costs, as against those of more conventional methods, is often impossible in such cases, because of variations in applied burden rate practice. Many large producers do not have departmentalized burden applications, and plant burden rates are, in most instances, much lower than the actual expense in automatic departments where labor content is low. They feel that their real competition is with other makers of the same consumer goods, and not with parts makers as such. As a result, an expense application rate of 100 to 125 pct on labor is not unusual, although an automatic department could hardly operate on less than 200 pct, and in many cases, considerably more, and the pieces that are the natural field for powder metallurgy are mostly produced in automatic machine departments, whether screw machine, punch press or diecasting.

The custom powder metal parts maker must (and often does) know his costs, and his prices are determined accordingly. With these figures he approaches the purchasing department, with a price on say, a small gear. After suitable maneuvering, the buyer calls the cost department to learn the cost of production in the plant gear department. Usually this cost is well below the quoted price; it almost must be because of the high burden loading that is required by the custom maker. Usually too, the cost that is given the buyer is looked upon as a definite and objective value—it is a *cost*. And yet, when broken down, it is often found that the applied expense rate—in an automatic gear cutting department, for instance—is as low as 120 pct on labor, the same as in the paint shop or assembly department.

This comparison exists often in the case of gears, but it appears in many other parts as well. It is one reason why only a small fraction of 1 pct of the gears used in America is made by the powder metal technique. The average salesman cannot talk costs, and under such conditions, the most economical process for producing small, accurate, wear-resistant gears, is given no further consideration.

The buyer often does not have access to the detail of costs and cannot afford to neglect the figures he is given, and is usually told that "costs are costs." Now if the powder metal equipment were installed in the same department, and the standard labor cost determined, and the plant burden rate applied, the economic comparison would show an entirely different result—and often that result would indicate tremendous savings.

It would be just as logical to use the plant rate in one case as in another. In fact, the equipment cost per unit of output would generally be lower with powder metal production than with conventional gear cutting equipment, but industry has been taught to think of powder metallurgy as a mysterious and esoteric thing—and the real advantages and possibilities are obscured by tradenames that are absolutely meaningless.

Trade Names Confuse Issue

The author has seen hundreds of drawings of powder metal parts or bearings, for instance, where the material specification notes listed as many as six competing names one after the other on the tracing, as toiling salesmen won their way into the hearts of buyer and engineer. Rarely are the really important factors listed; the trade names, with their "equivalency", seem to be all that interests many buyers and engineers. The reasoning is about the same as that which would be shown by the specification of one particular brand of 1110 steel on drawings of screw machine parts.

Few people outside the business have actually seen the production of parts by powder metallurgical methods. Everyone who has seen the operations almost without exception has been thrilled by the apparent simplicity, high rate of production, and cost-saving possibilities.

It is the author's firm conviction that until powder metallurgical methods are placed along the production line—with automatic screw machines and grinders and heat-treating furnaces—the process will continue to be nothing but a minor adjunct in the production picture, and society will lose the real savings that its general use would make possible. Material, men, machines are available. So used, they will make this process of the value to industry that its real worth merits.

New Developments In Powder Metallurgy

By G. J. COMSTOCK and J. D. SHAW

Stevens Institute of Technology, Hoboken, N. J.

Two developments in particular, (1) production of precast powders, and (2) hot pressing of powders, are held by the authors to offer distinct advantages for improving and expanding industrial powder metallurgy. The second of these two lines of developments, hot pressing, although still in the experimental stage, appears to be the means of fabricating many of the precast alloy powders at pressures far below those now required by cold pressing.

POWDER metallurgy as originally conceived was a manipulation of primary metallic elements in powder form. A later conception envisioned combinations of primary metallic powders and even combinations of metallic and nonmetallic powders. If the development of a technique is to be judged by its principal commercial products and their influences upon manufacturing procedure, a study of the principal products of powder metallurgy to date indicates we have not progressed materially beyond our original conception and those amplifications which have just been mentioned.

In order of their commercial development the major products of powder metallurgy may be listed in the following manner:

(1) Early forms of platinum, tungsten, molybdenum, tantalum, and porous metal bodies (originally byproducts or metals plus oxides).

(2) The hard cemented carbides (intermetallic compounds plus primary metallic powders).

(3) Electrode and contact materials (in some cases, metallics plus nonmetallics—a pot-pourri of metallics and nonmetallics).

(4) Parts and articles made from one or more metallics in powder form and molded to eliminate machining operations.

A study of this list reveals that all of these parts can be divided into two classes, i.e., those in which the consolidation during heat treatment is dependent upon particle to particle melting or adhesion of particles in the presence of a melting constituent and second, those in which a melting constituent acts in part at least as a cementing medium for the higher melting constituent which must be present in measured proportion.

The results of the industrial application of powder metallurgy based on the original conception must be regarded as being of extreme importance. The products prepared by this means have resulted in the formation of a number of industries by accident.

On the other hand, there has been a constant search for added improvements in the metal powder technique which would widen and amplify its field of application. It seems to those who have worked in this art for a number of years that two lines of development offer particular promise.

As originally conceived, the production of alloy powder products depended upon (1) the formation of an alloy by solid diffusion, or (2) the formation of an alloy under conditions where, of necessity, a minor amount was molten. Both of these methods of producing alloys imposed severe restrictions upon the final product. In the first case, complete diffusion depended both upon the distribution of the alloying components and upon a time interval for additional diffusion, which in many cases was too long for practical application. In the second set of circumstances, the fact that one component must be only a small part of the total alloy composition eliminated many of the alloys which it was designed to produce.

The production of precast alloy powders was, therefore, regarded as a most attractive means for widening the scope of metal powder manipulation. The work of producing alloy powders in commercial quantities has been going on in a number of metal powder plants for some considerable time. Atomizing of the lower melting point alloys and even some of those in the medium melting point range is an approved method which has demonstrated its value. No one at the present time or for several years past would think of producing brass parts from combinations of copper and zinc powder. On the other hand, when it became desirable to produce corrosion-resistant parts of "nickel-silver" the requisite powder was not available in com-

mercial quantities. Obviously the production of copper, nickel and zinc alloys by solid diffusion of the primary metallic elements involved difficulties which made the process unattractive.

As a result of work done in this country and abroad, various processes have been developed for the limited commercial development of almost any alloy which can be melted. Originally the Germans began this work. Their ventures were quickly followed by those of British investigators and later by work done in the United States. Fortunately none of the methods or plans of development were identical, so that a wide variety of possibilities have already been investigated. It has been demonstrated that between 50 and 60 standard alloys can now be produced by disintegration from their molten form. Many more are still in the experimental development stage. These newer alloys, of course, are the higher melting point materials and it may be that unexpected difficulties will be encountered in preparing them in powder form. The results, however, to date are fortunately most encouraging. From the evidence at hand, it seems safe to say that eventually any alloy that can be melted can be turned into fine powder by one or another of the present disintegrating methods now under experimentation.

The effect of the application of precast alloys powders on development of applied powder metallurgy is yet to be determined. It seems reasonable to assume, however, that many new products will result. For example, the physical properties of a porous metal powder bearing which has been made in the now standard process, by heat-treating copper and tin and other ingredients, can not be the same as those of a bearing which has been made from a precast alloy powder plus a primary metallic powder plus other ingredients. The bearing containing the precast alloy powder may not be better, but it is certain that it will not be the same as that produced in the previous method. Similarly, friction materials can be made with precast alloy powder constituents with changed end effects. The corrosion-resisting "nickel-silver" objects can now be made, as can a wide variety of other new materials. Among these certainly should be mentioned a whole new set of contact and electrode materials.

Precast Powders Offer Promise

In considering these new products, emphasis should be placed on the fact that the original conception of this art is not necessarily modified; its two main principles are still just as important as ever. Combinations of precast alloy powders with primary metallic powders, or combinations of precast alloy powders with nonmetallics must be given as much consideration as the simple combination of precast alloy powder. Similarly, combinations of precast alloy powders with minor proportions of lower melting constituents must be thoroughly investigated. It is hoped that some of these combinations will result in a series of heat-resistant metallic materials which will find application to the many new problems imposed by jet propulsion and high temperature turbine applications.

The second road down which it would be advantageous to move, is a path which has wound rather torturously through a field of past experimentation. For a long time, experiments have conclusively indicated that the production of metallic bodies from powders by the simple method of pressing powders at room temperature and subjecting them to a consolidating heat treatment, did not always result in the attainment of theoretical densities. At the same time, other experiments have just as conclusively demonstrated that when metallic powders are simultaneously subjected to heat and pressure under optimum conditions, high densities are secured with comparatively low pressures. This process is the hot-pressing method about which so much has been written and so little has been done when one considers the potentialities which are involved. The few commercial applications of hot pressing which have been successfully made to date have been most encouraging. Unfortunately there have been altogether too few of them.

The production of very large metal powder objects has been severely limited by the fact that if they are to be produced by commercial technique now employed in the manipulation of powders, very large, slow and expensive pressing equipment is unavoidably involved. One company with which the authors have been in contact hesitated, quite naturally, in the production of outsized parts because of the expense involved in the pressing equipment and the slowness with which the articles could be produced.

If the authors are not in error in the conception of the end results which can be obtained, or misled by the examination of hot-pressed samples which have been experimentally produced in their laboratory, the high density obtained by the hot pressing method offers great encouragement for the production of high strength and high density materials suitable for many applications now beyond the scope of metal powder products.

Hot-Pressing Reduces Pressure Requirements

It seems that the future production of precast alloy powders will lead, of necessity, to hot pressing. The primary metallic powders have one great advantage which favored their use in the beginning of applied powder metallurgy. Most of them could be produced in powder form in a very soft and workable condition. This led to their being pressed into the desired shape with relative ease and, in many cases, without very severe cold-working effects. Even the preliminary experiments indicate that many of the precast alloy powders will work satisfactorily in the cold-press method only to the extent which involves high pressures, if normal densities are to be produced. Hot pressing, however, in most cases eliminates this difficulty and results in structures which are satisfactory for most applications.

A survey of the possibilities for improving and expanding industrial powder metallurgy seems to indicate that the production of precast alloy powders and the development of hot-pressing techniques are at least two of the most encouraging aspects of the present situation. Even without these developments the new uses for metal powder processes are increasing at an encouraging rate. The widened use of the products of this art had been encouraged by war production—the hard cemented carbide tool and die materials are an excellent example of this fact.

The outstanding performance of metal powder friction materials in tanks and airplanes has demonstrated the advantages of their application to peacetime conveniences. The advantages which were obtainable in the production of small parts by pressing them from powders instead of machining them from sheet, bar or rod form has become a matter of common knowledge to many engineers and manufacturers who otherwise would possibly not have had this process brought to their attention.

Hardness Distribution In Chips and Machined Surfaces

During the machining process, the hardness of steel may be increased as much as 300 pct, and this has an important bearing on the life of cutting tools and the serviceability of the machined surfaces. The results of the experimental work by which this fact was determined are discussed herein, and a method is given whereby the hardening effects produced by cutting can be predicted from the work-hardening properties of the metal, as measured by the Meyer exponent. The usefulness of micro-hardness tests as an aid in the study of machinability is thus clearly indicated.

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IN his now classic paper given before the ASME 20 years ago, E. G. Herbert[1] showed that metal may be very severely hardened by the cutting process, and pointed out some of the implications of this fact. Advances made since this time in microhardness testing equipment and in knowledge of the mechanism of the metal cutting process open the way to a more detailed study of the hardness distribution produced in chips and machined surfaces by the action of a cutting tool, and to a fuller correlation of the resulting data with the geometry of chip formation. In this article are reported the results of a fairly extensive study of this problem in relation to the three basic types of chips, together with the practical implications of the experimental and theoretical findings.

In the process of chip formation, the cutting conditions determine the type of chip resulting from the operation. The various kinds of chips have been classified into three basic types by Ernst[2]. An example of each is shown in fig. 1. Type 1 represents the discontinuous chip; while types 2 and 3 are both continuous chips without and with a built-up edge respectively.

Hardness measurements were made on all three types of chips. These chips were obtained from cutting tests in which the tool and workpiece relationship was similar to that shown in fig. 2. In order that the hardness measurements made on the chip be characteristic of conditions existing during cutting, the cutting process had to be stopped almost instantaneously. The chips used for these measurements were obtained by employing the shear pin method of quick-stopping as described by Ernst[3].

The microhardness distribution as found on the various chip specimens was obtained with a Tukon Tester, using loads of 25 and 1000 g. This unit employs a sensitive diamond indenting tool termed a Knoop Indenter[4] to which may be applied various loads from 25 to 3600 g. The hardness values presented throughout this article are Knoop hardness numbers.

Type 3 Chip

The first type of specimen to be subjected to microhardness surveys was that of the continuous chip with built-up edge, known as type 3. This type proved to be extremely interesting for a number of reasons which will each be discussed in detail. The type 3 chip, as pointed out by Ernst and Merchant[5], is produced when the coefficient of friction between the tool and the chip exceeds a certain minimum value depending upon the metal being cut. Under these conditions, the stress on some plane in the chip (a plane extending from the tool face down to the face of the chip) becomes equal to the shear strength of the chip metal. Failure then occurs on that plane and a section of the chip remains anchored to the tool face to form the built-up edge. As this built-up edge continues to in-

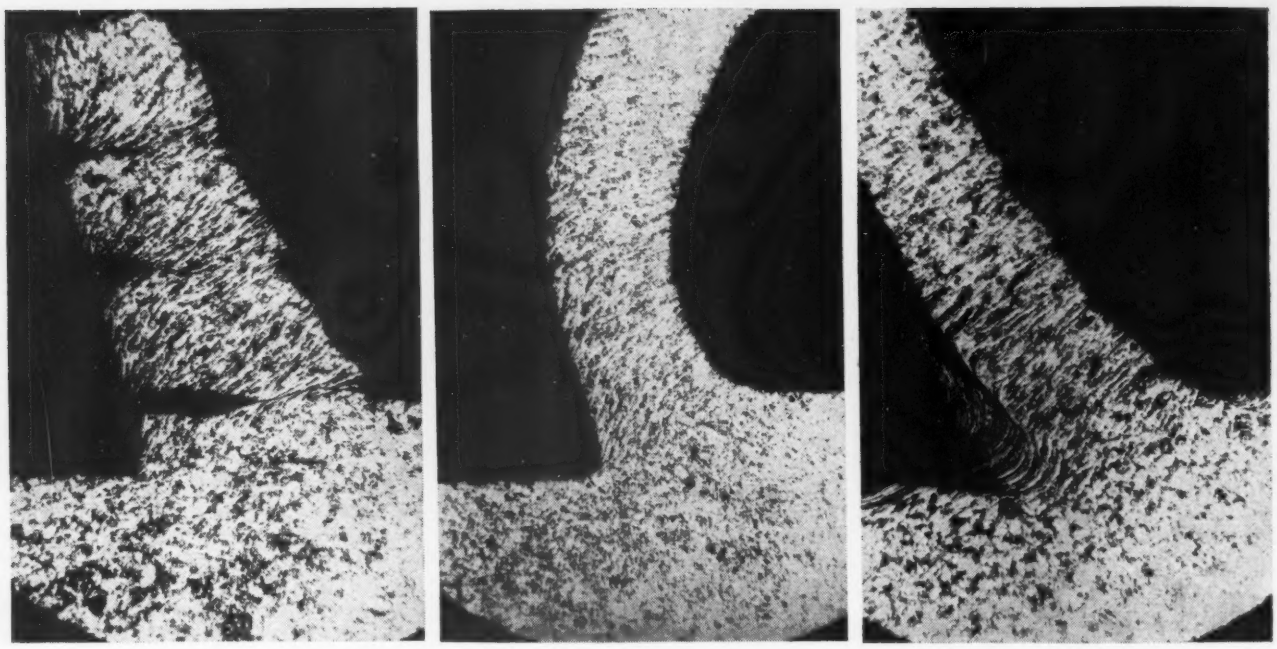
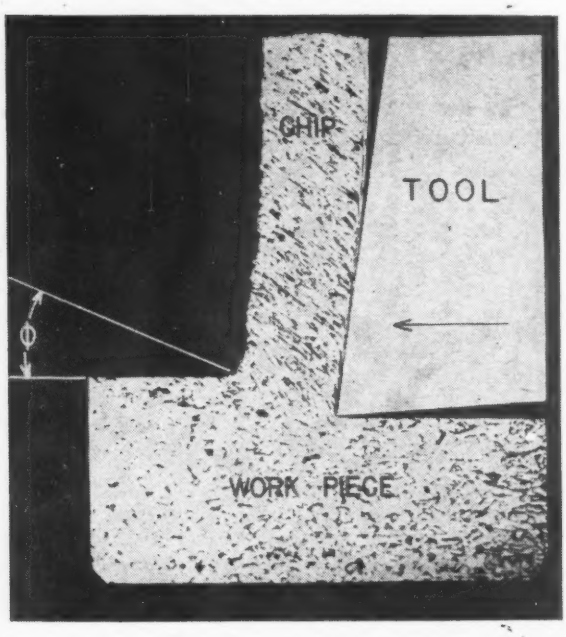


FIG. 1—The three basic chip types: Type 1 (left) discontinuous or segmental type; type 2 (center) continuous type without built-up edge; type 3 (right) continuous type with built-up edge.

crease in size during the cutting process, it soon reaches such proportions that it can no longer be carried en masse by the tool; hence, fragments thereof pass off with both the chip and the workpiece.

The results of microhardness surveys on a type 3 chip specimen produced by broaching are presented in fig. 3. The photomicrograph shows the structural features of the specimen, and some of the hardness indentations also may be discerned. However, actual hardness values and their exact location are shown in the corresponding line drawing which forms a part of the illustration. The large indentations outlined in the diagram in their true diamond shape were made with the 1000 g load, while those represented by a short heavy line were made with the 25 g load. The

FIG. 2—Relationship of cutting tool to chip and workpiece in chip photomicrographs.



first point of interest to be noted from this specimen is that even the chip proper, exclusive of built-up edge, is surprisingly hardened. For example, the SAE 1020 steel specimen cut with a positive 15° rake angle tool, shown in fig. 3, illustrates an increased hardness of the chip over the parent metal of 113 pct. This hardening of the chip may be attributed to the large shearing strain to which the metal has been subjected, but a comprehensive discussion of this strain-hardening has been reserved for later in the article.

Probably the most interesting feature of a type 3 chip specimen is the built-up edge itself. The hardness of this was therefore explored quite thoroughly. Here even higher values of hardness are found than in the chip proper. For example, the hardness of SAE 1112 was 212 to 217 before machining; afterward values of 548 and 607 are found at the base of the built-up edge. Further, the average hardness for this region is 477. The chip specimen shown in fig. 3, produced from a low carbon steel (SAE 1020) with a high speed steel tool cutting at 40 fpm, represents a very unusual case. Cutting happened to be stopped at just the right moment to catch an entire built-up edge passing off with the chip, and about to scrape over the tool face, while a new built-up edge is in the process of formation below. The soft steel which was being cut in this case is strainhardened to such an extent that the hardness of some sections of the upper built-up edge reach values well over 600 Knoop number. In fact, the average hardness over the whole of this escaping built-up edge is 573, while the average for the newly forming one is only 474. The increase in hardness is just as phenomenal in the case of SAE 3115 chips. This showed an increase in hardness from under 250 to values of over 700 in the built-up edge. Even the average microhardness of the built-up edge is, in this case, 599. The cause of the extreme hardness of the metal in any built-up edge, such as those above, may be attributed to the very high shearing strain which it has undergone. This point is discussed in more detail later.

Another interesting feature of the type 3 chip is

found in the fragments of built-up edge which are sloughed off onto the finished surface. The detrimental effects of these asperities on a bearing surface can be imagined and are greatly aggravated by the fact that the fragments are extremely hard. Values exceeding 750 Knoop number were indicated on fragments of the SAE 3115 specimen, and the average hardness of the entire fragment was 567. It is interesting to note also the hardness of the machined surface between the fragments in the aforementioned specimens. In the case of the SAE 1020, values of hardness ranging from 314 to 445 are obtained at the surface. Five thousandths of an inch below the surface, the hardness of the metal is normal.

The harmful effects which the presence of the built-up edge has on the life of the cutting tool can hardly be overemphasized. Since this built-up edge continually sheds very hard fragments which pass off with the chip and work surface, these asperities must rub over the face and flank of the cutting tool. Being of

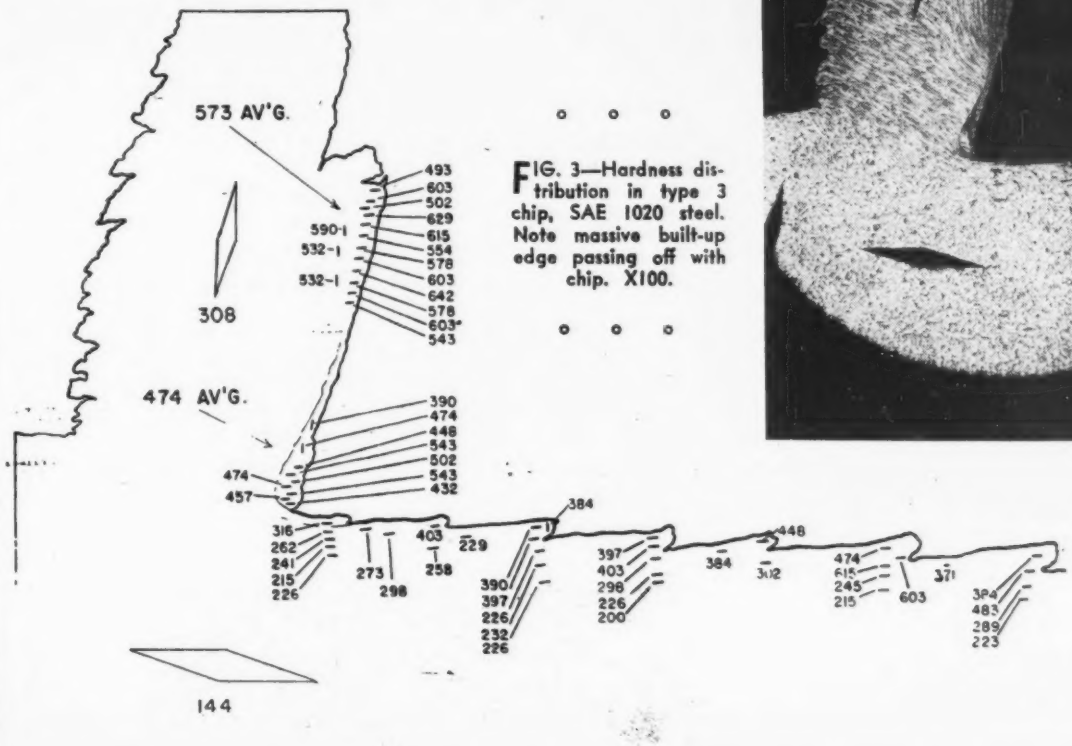


FIG. 3—Hardness distribution in type 3 chip, SAE 1020 steel. Note massive built-up edge passing off with chip. X100.

a hardness approaching that of the tool, these fragments cause craters to form on the face of the tool and excessive wear on the flank which of course results in short tool life.

In the preceding discussion of the type 3 chip, the very high values of hardness found in the built-up edge and in fragments thereof have been attributed to strain-hardening only. However, the question naturally arises as to whether some of this hardening may not actually be due to metallurgical phase changes brought about by the severe deformation. In order to investigate this possibility, the structure of a portion of the built-up edge and of a fragment thereof, as found in the SAE 1020 steel specimen of fig. 3, was studied at a magnification of 2000. Fig. 4 is the resulting photomicrograph. While an unequivocal evaluation of the structure is not possible from this photomicrograph, it does appear that the severely elongated black areas are still lamellar in nature and thus apparently pearlitic. If this is true, then the strikingly high values of hardness found for such areas must indeed be attributed entirely to the severe straining of the metal. A discussion of the relation between this increased hardness and strain is given later.

Type 2 Chip

The microhardness exploration was continued with a study of the type 2 chip. This type is represented by a continuous chip without built-up edge. Fig. 5 represents the results of hardness explorations on this type of chip. The chip specimens were obtained from an SAE 1112 steel with carbide tools at a cutting speed of 1180 fpm. It is at once apparent from the photomicrograph that the elimination of the built-up edge results in a smooth machined surface and also a smooth surface on the side of the chip which passes over the tool face. A further study of the figure shows that both of these smooth surfaces have been severely hardened in the cutting process. However, the life of the tool should be greater here than in the case of a type 3 chip, for no fragments of built-up edge are present on either surface to cause excessive gouging of the flank or face of the tool.

The machined surface pictured in fig. 5, which was produced with a 10° negative rake angle tool, has an average hardness of over 300. Since it is a smooth, hard surface, however, it should have excellent abrasion resistance in service. It is interesting to note

FIG. 4—Structure at base of built-up edge of chip shown in fig. 3. X2000.

that its appearance is similar to that of a thoroughly run-in surface.

Type 1 Chip

The study of the hardness distribution in chip specimens was continued with a survey of the type 1 or discontinuous chip. This type prevails when, in the process of chip formation, the deformation of the metal becomes so great that fracture occurs. The chip then consists of a series of separate segments. The results of a hardness survey on this type of chip are illustrated in fig. 6. Here the chip, cut from an SAE 1020 steel at a very low speed, shows evidence of this severe strain-hardening. The hardness within the body of the chip has been increased 54 pct, and on the surface of the chip the increase is 123 pct. From the hardness measurement made on the machined surface, the increase there is found to be 98 pct. The start of new segment of chip may be seen at the cutting edge, and even this shows a 125 pct increase in hardness.

Hardening and Chip Geometry

Earlier in this article, attention was drawn to the fact that the chip proper is considerably hardened by the cutting process. This behavior is, of course, to be expected because of the strain-hardening which accompanies the deformation that the chip metal has undergone. However, it is of interest to relate the distribution of this hardness specifically to the geometry of chip formation in the case of a continuous chip (types 2 or 3). It is known that this type of chip is produced by a process of plastic flow or shear, without rupture, confined to a narrow zone extending from the cutting edge of the tool to the work surface, and known as the shear plane. This plane of transition between the relatively undeformed crystal structure of the work material and the severely distorted structure present in the chip is evident in the photomicrographs of continuous chips shown in this article. It may be seen very clearly at high magnifications in fig. 7. This plane of shear is further illustrated diagrammatically in fig. 8 as the line running from the tool point to the work surface and making an angle with that surface. (Angle ϕ is known as the shear angle, and will be discussed later in more detail.)

An exploration of the hardness distribution in the vicinity of the plane of shear, using a 25 g load on

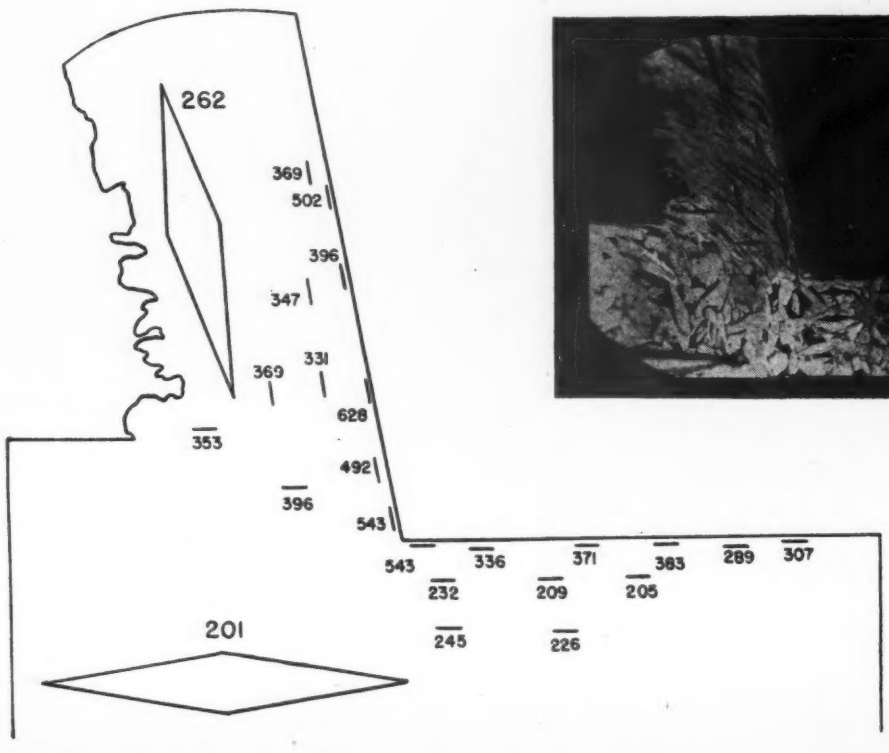


FIG. 5—Hardness distribution in type 2 high speed milling chip from SAE 1112 steel. Note hard, smooth finished surface. X500.

the Knoop indenter, showed that at the shear plane the hardness of the metal changes very abruptly from that of the undeformed work material to that of the severely deformed chip. These measurements thus serve to demonstrate the narrowness of the zone in which occurs the process of shear whereby a continuous chip is generated. Practically all of this plastic deformation must be confined to this shear plane. Thus is further confirmation given to a fact previously inferred from chip photomicrographs alone.

It was also noted that the chip itself is harder in the region close to the face of the cutting tool than it is elsewhere throughout its bulk. The increased

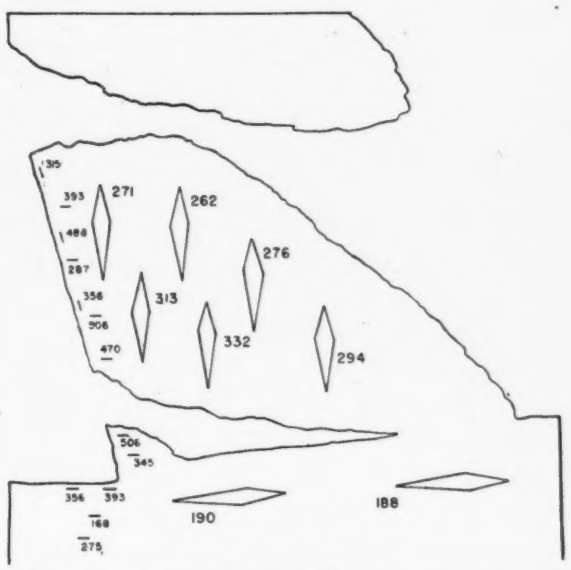


FIG. 6—Hardness distribution in type 1 chip from SAE 1020 steel. X100.

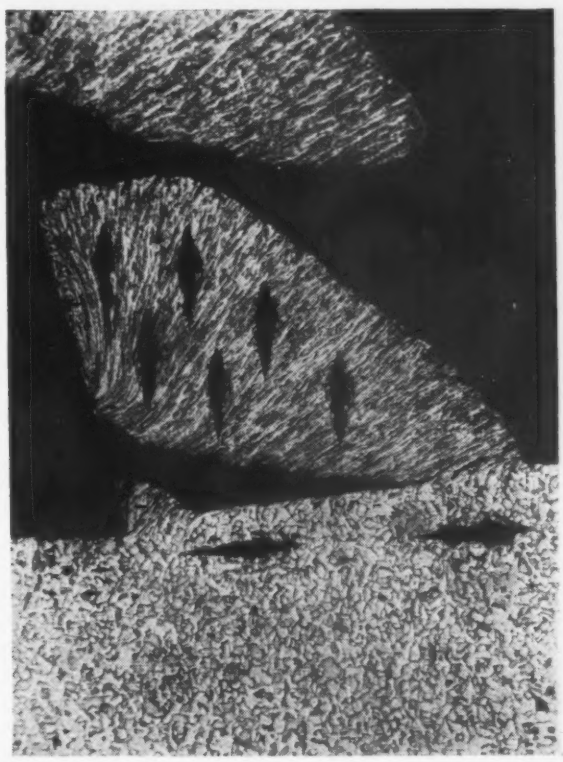
hardness of the chip in the vicinity of the tool face may be attributed to an additional plastic deformation of the chip metal that is produced by the large force of friction acting between the sliding chip and the tool. This deformation occurs subsequent to that taking place on the shear plane, the shear occurring in a direction approximately parallel to the face of the tool. This process of shear is evidenced in photomicrographs by the curving downward of the stringers of deformed pearlite in the vicinity of the tool face. The deformation is evidently most severe in a very thin layer just adjacent to the tool face, a fact which accounts for the very high values of hardness found in this innermost layer. It is of interest to note that it is this process of shear in a direction roughly parallel to the tool face which, when carried to extremes by a very high force of friction, is responsible for the formation of a stable built-up edge adjacent to the tool face, and thus of a type 3 chip, in the manner previously described.

Hardening and Shearing Strain

It is now a well-established fact that the shear angle ϕ, defined above, is variable in magnitude, its value depending upon the cutting conditions. It has been shown by Merchant[6] that the natural shearing strain, ϵ, to which the metal going into a continuous chip is subjected is a function of this shear angle, ϕ, and of the tool rake angle, α (see fig. 8), as follows:

$$\epsilon = \cot \phi + \tan (\phi - \alpha) \qquad (1)$$

The larger the angle of shear and the larger the rake angle of the tool, the less will be the strain to which the metal in the chip is subjected. The relation between this calculable shearing strain and the resulting hardening of the chip metal was investigated experimentally. Measurements were made of the hardness of 15 different chip specimens prepared from cold-rolled SAE 1112 steel under different conditions of cutting speed and with three different rake angles. Of these specimens, one was a broaching chip cut at a speed of 40 fpm with a high speed steel tool having a rake angle of + 15°, while the remainder were milling chips made with sintered carbide cutters having



either + 10° or — 10° rake angles and operating at various speeds. The observed shearing strains ranged from 2.3 to 9.5, as determined by substituting the measured shear angles and known rake angles into equation (1). The resulting relationship between these shearing strains and the corresponding percentage increase in the hardness of the chip over that of the work material is represented by the solid portion of the lowest of the three curves shown in fig. 9. It is at once evident that the amount of hardening increases in an essentially linear manner with increasing plastic shearing strain, irrespective of the cutting conditions. This is a somewhat surprising result in view of the widely different temperatures which must have existed in the chips taken under different cutting conditions. Apparently cooling of the chip is so rapid after removal that the amount of annealing which occurs is inconsequential.

The fact that the hardening of the chip removed by a cutting tool depends directly and only upon the amount of shearing strain which it has undergone makes it evident that the hardness of chips coming from machining operations will be a function of the cutting speeds, feeds, rake angles, etc., that are used,

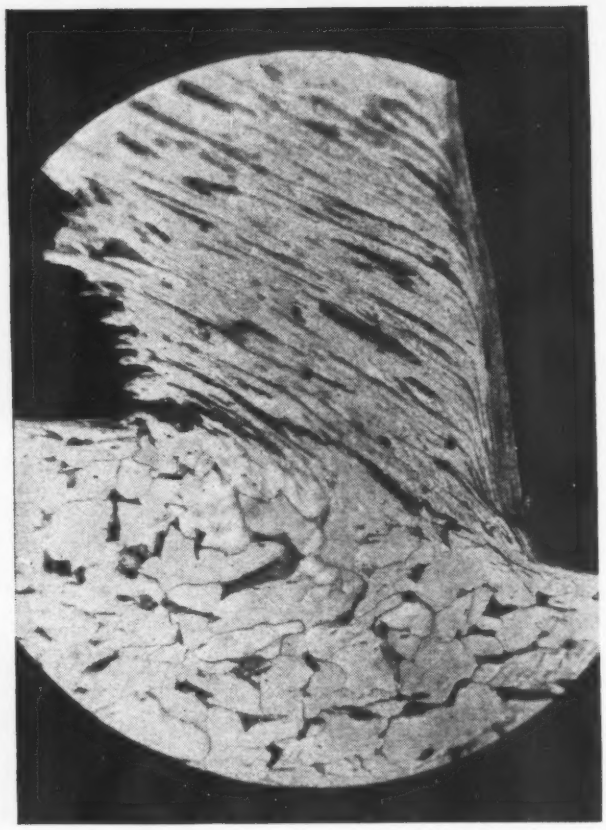


FIG. 7—Photomicrograph showing appearance of shear plane which constitutes the transition region between a continuous chip and the workpiece. X500.

because these variables affect the shearing strain by producing variations in the shear angle. The hardening of the chip should in turn affect the life of the cutting tool by influencing its ability to abrade the tool face, though the additional hardening arising from the further deformation of the chip metal in the vicinity of the tool face (as previously discussed) also must be borne in mind. However, it can be shown that, for a given material, the amount of this additional deformation is closely related to the amount of initial deformation occurring on the shear plane. Therefore, it is to be expected that, if other machining conditions are kept constant and the shearing strain ϵ is decreased, tool life will be increased. This can be accomplished, for example, by the application of an effective cutting fluid to a machining operation, thereby increasing the shear angle.

The linear relationship between hardening and shearing strain demonstrated for SAE 1112 steel in fig. 9 may be extrapolated to furnish an estimate of the approximate value of shearing strain undergone by the metal in the built-up edge of the chip, and in the hard layer adjacent to the tool face in the chip. This extrapolation has been made by means of the dotted line which extends the curve for SAE 1112 in fig. 9. On this line have been plotted, using x as a symbol, the hardness increases represented by the average hardness of the above built-up edge and hard layer. It is thereby evident that a shearing strain of the order of 15 is indicated for the built-up edge, and a shearing strain of the order of 18 for the hard layer adjacent the tool face. These are strikingly high values of shearing strain for a metal to undergo without fracture, and are only possible because the very high values of compressive stress are known to permit the occurrence of large shearing strains without rupture, Bridgman[7] having observed shearing strains of over 100, obtained without fracture under the influence of severe compressive stresses.

It is perhaps doubtful whether the linear relationship made use of in the above extrapolation actually persists to such high values of strain, but such an extrapolation at least gives a fairly good estimate as to the values of shearing strain undergone by the metal in the regions in question. Further, the estimated values also are consistent with the observed deformation of the structure in the regions in question, as seen in the photomicrographs. To illustrate this point, it must first be explained that, in photomicrographs of severely deformed metal, the cotangent of the angle between the elongated pearlite stringers and the direction of shear is approximately equal to

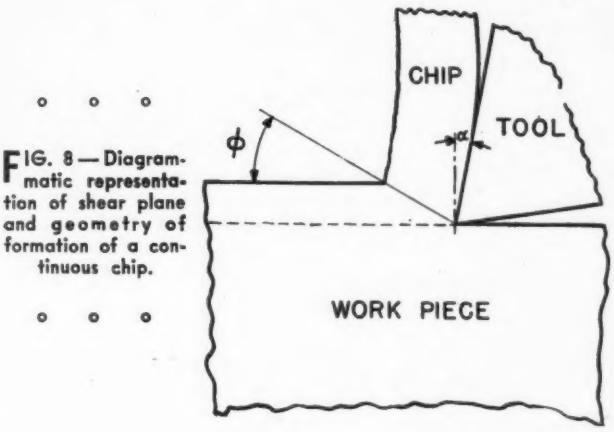


FIG. 8—Diagrammatic representation of shear plane and geometry of formation of a continuous chip.

the shearing strain. Referring to fig. 5, it may readily be seen that the angle between the tool face and the pearlite stringers in the hard region adjacent thereto is not over 3°. The cotangent of 3° is 19.

Two other curves are plotted in fig. 9, in addition to that for the SAE 1112 steel. These are for the chip specimen of SAE 3115 cold-rolled steel, and the one of SAE 1020 hot-rolled steel. As might be expected, the hot-rolled steel exhibits more strain-hardening than either of the cold-rolled materials. Unfortunately, only one experimental point is available for use in determining the slope of each curve, since only one chip specimen from each material was available. It is therefore necessary to assume that these steels also give strain-hardening curves which are linear up to fairly high values of strain, though this is not unreasonable. The experimental points relating the observed shearing strain to the observed hardening of the chip proper for these two specimens are indicated by the x's lying at the ends of the solid portions of the corresponding curves in fig. 9. These curves have then been extrapolated, as indicated by the dotted lines, to obtain estimates of the approximate shearing strains undergone by the metal in the built-up edge.

Meyer Exponent

The fact that different metals exhibit different strain-hardening characteristics of the type shown in fig. 9 is of general practical significance. For instance, if two similar steels which have similar initial hardnesses should show widely different strain-hardening characteristics when machined, then it is to be ex-

pected that the one which strain-hardens most rapidly (i. e., has the greatest slope to its strain-hardening curve) would be the more destructive to the cutting tool under similar conditions of shearing strain.

For this reason it becomes important to be able to determine the strain-hardening properties of a metal from simple tests, before machining. Probably the simplest known way of measuring the strain-hardening ability of a metal is by means of so-called Meyer analysis. This is carried out by using a spherical hardness indenter, indenting the metal at a series of different loads, and measuring the diameters of the resulting indentations. The relationship between load and diameter was shown by Meyer (8) to be of the form $L = a\,d^n$ where L = load on indenter, d = diameter of indentation, a = a constant characteristic of the metal and the diameter of the ball, and n = Meyer exponent.

Thus if load is plotted against indentation diameter on double log paper a straight line results, and the slope of this line gives the Meyer exponent *n*. This Meyer exponent, which must be equal to or greater than 2 for an isotropic metal, is a direct measure of the strain hardenability of a material, higher values of *n* being indicative of greater work-hardening ability and vice-versa, as may be readily appreciated from the nature of the Meyer equation. It is to be expected therefore that the slope of strain-hardening curves found from cutting tests, such as those in fig. 9, should be directly related to the Meyer exponent, a greater slope being associated with a higher value of the exponent.

This was found to be the case. When the slopes of the three curves shown in fig. 9 were plotted against Meyer exponents determined from measurements (using a ⅛-in. diam. ball) on the three corresponding steels, the curve shown in fig. 10 resulted. A curve of this type should be of practical value in machinability determinations, for it allows easily measured Meyer exponents to be used to predict the slopes of the strain-hardening curves applicable to the cutting process. From these may be found the amount of hardening to be expected from the different materials when they are subjected to equivalent strains in cutting. As already pointed out, the amount of hardening which the metal undergoes during the process of chip formation should have an appreciable influence on the wear of the cutting tool.

Admittedly this picture is still incomplete, in that it is not as yet possible to predict unequivocally the shearing strains to which the various types and phases of chip formation will subject a metal. Nevertheless, fair estimates of these can be made in the light of the date presented, and these in turn used to predict the hardness which the metal will attain so that its effect on tool life and other phases of machinability may be judged. Thus, it would appear that the present study constitutes a further step toward the goal of being able to predict the machinability of materials from simple measurements of their physical properties.

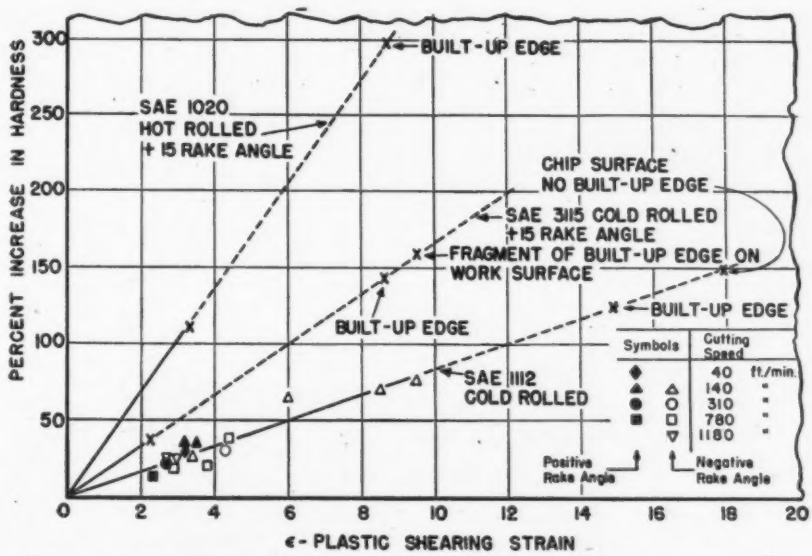


FIG. 9—Relation between the amount of hardening of metal in process of chip formation and the natural shearing strain undergone by that metal.

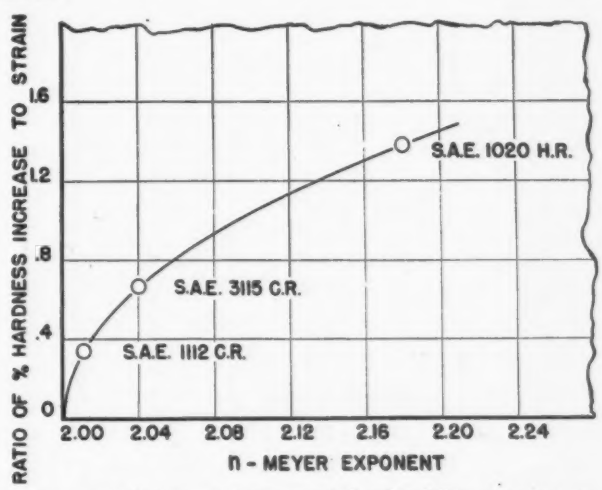


FIG. 10—Relation of Meyer strain-hardenability exponent to slope of curves shown in fig. 9.

This article is an extended abstract of a paper presented at the recent ASME annual meeting.

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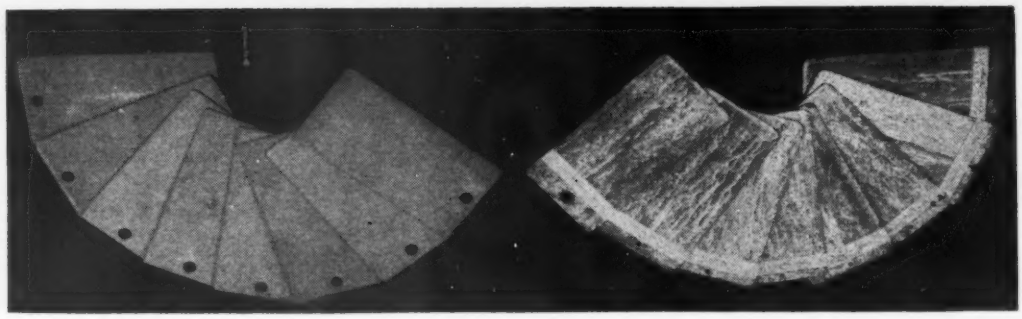


FIG. 1—Comparison of coated panels before and after 1000 hr exposure in salt fog corrosion equipment.

New Anticorrosive Finish Gives 20 Years' Protection

ZINCILATE, a "self-protecting" coating developed to protect ferrous metal surfaces from atmospheric corrosion, is reported by the manufacturer, Industrial Metal Protectives, Inc., Dayton, to have a life greater than any known metal covering and to afford protection to metals exposed to severe weathering conditions for a period of 20 years or more without further application. It can be applied cold by brushing, spraying or dipping; sets up in a short time and can be pigmented, painted or plated.

Characteristics such as uniformity, galvanic protective power, resistance of the coating itself to disintegration after long periods of exposure, ability to be pigmented without adverse effects, and absence of reaction of the zinc content with the balance of the coating are claimed for this newly introduced finish. Zincilate is said to possess sufficient galvanic action to make it self-healing for long periods of time, and if it does not completely cover the underlying metal structure, or if small sections are scraped or worn off, the exposed metal continues to be protected, unless too large an area of the coating has been removed. Further, the coating is not porous, provides a hard durable coating, has good abrasion resistance, and is said to be resistant to mild chemicals, liquids and gases.

According to the manufacturer, Zincilate has been tested successfully under severe conditions such as dust storms, high humidity, semitropical climates, extreme heat, climatic extremes and in sea coast areas. It has been tested on marine structures, pipe lines, hydroelectric installations, high tension wire towers, oil well equipment, barges and construction equipment where normal repainting is difficult, if not impossible.

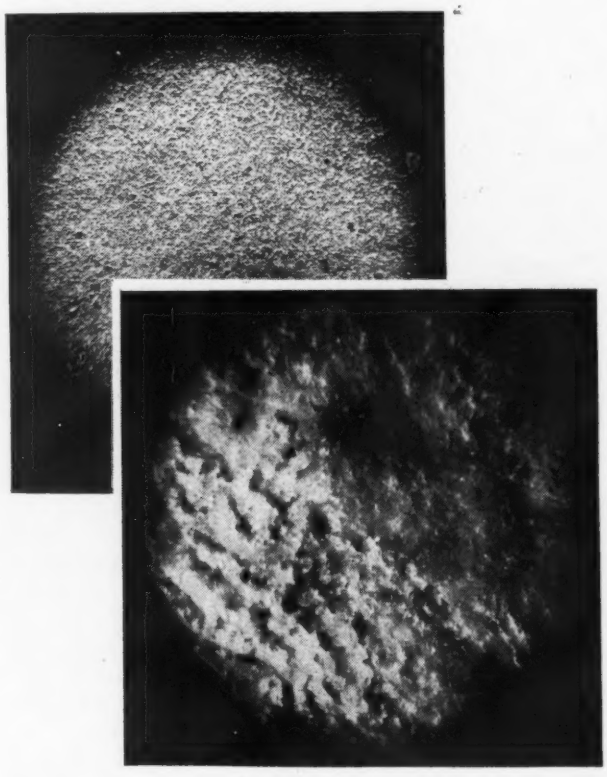
Laboratory tests are said to show that Zincilate lasts under salt spray, ultraviolet light, and other standard tests for a period of time equivalent to 30 years without sign of breakdown. In fig. 1 a comparison is given between freshly coated panels and coated panels which have been subjected to 1000 hr exposure in standard ASTM salt fog corrosion equipment. Fig. 2 (A) shows a fresh application on a test panel at 50 diam. A photomicrograph of the same coating after 1000 hr immersion in a 20 pct salt spray solution may be seen in fig. 2 (B). This test is estimated to be the equivalent of 20 years normal exposure. The surface shows little change from initial exposure.

There is no hazard from fumes, odors, or explosion of highly volatile solvents, according to the manufacturer, and therefore a spray booth or ventilation system is not required when application is made in paint rooms.

The coating air dries without further treatment in from a few hours to several days, depending on the outside temperature and humidity; or it may be dried in a few minutes to an hour when heat is applied. The heating time for drying depends upon whether the metal is first preheated and whether infrared ray lamps are used for drying, or whether hot air blast or other forms of heating are employed. After spray-

(CONTINUED ON PAGE 152)

FIG. 2—Photomicrographs of Zincilate test panels before and after a salt spray test. Top specimen shows a freshly applied coating. Note the smooth surface. Bottom micro is a panel section after 1000 hr immersion in a 20 pct salt spray solution. Both illustrations at 50X.



How to Use

Carbide Cutters for Milling

...Planning Carbide Milling Operations
...Specifying Surface Foot Rates
...Specifying Cutter Diameter

The transition from conventional to carbide milling cannot be made in any haphazard fashion, but each job must be carefully studied in the light of its particular characteristics. In this article, the 13th of a series covering carbide milling, the author gives detailed information on how to select the correct surface foot rates for the 11 major groups of materials, and how to select the most suitable size of cutter.

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EFFICIENT and effective planning of carbide milling operations involves rationalizing the job by competent and thorough going analysis and a scientific attitude of mind in making such an approach. It demands also a knowledge of the technique of metal removal with carbide tools. The following ten steps are presented as the result of extensive experience in planning such operations:

(1) Know the material in the workpiece;
(2) Determine the surface foot rate;
(3) Specify cutter diameter, grade of carbide, type of cutter, cutting and clearance angles;
(4) Analyze workpiece and setup for maximum possible metal removal rate;
(5) Check this metal removal rate (inherent in the workpiece and its holding) against the metal removal rate possible with the horsepower available in the machine;
(6) Establish from the foregoing data, the corresponding feed rate;
(7) Check chip load;
(8) Specify method of milling, that is, relationship of cutter and workpiece movements;
(9) Set up grinding and care of cutter techniques
(10) Check first run pieces for accuracy and finish specification.

A fuzzy-minded approach to the workpiece, its physical and metallurgical makeup, is a certain step toward failure. The job must be known in its material, carbon content, hardness, whether cast, rolled or forged, etc. On a complete knowledge of the material in the component about to be milled depends the effectiveness of the subsequent steps in the planning of the carbide milling technique. The material must therefore be identified and classified in one of the following 11 groups or classes:

(1) Wrought iron
(2) Low carbon steel—from 5 to 15 points of carbon
(3) Stainless steel
(4) Standard SAE classifications beginning around SAE 1015 or SAE 1020
(5) Cast steel
(6) Cast iron—unmodified and uncontrolled
(7) Cast iron—modified as semisteel or controlled as Meehanite, Linite, etc.
(8) Cast iron—special, as white iron, chilled, etc.
(9) Malleable
(10) Brasses and bronzes
(11) Nonferrous materials such as aluminum, magnesium and their alloys, copper and its alloys, etc., also plastics.

Once the workpiece is tagged and identified in the manner indicated above, the next step in the analysis and planning of the milling job can be undertaken. This consists of specifying the proper surface foot rate.

The speed at which a job is milled is entirely inde-

Previous articles in this series covering carbide milling were as follows:

Part No.	*Subject*	*Issue Date*
1.	Fundamentals of carbide milling.	Feb. 13, 1947
2.	Low carbon steel and wrought iron.	Feb. 20, 1947
3.	Straight carbon and cast steel.	Feb. 27, 1947
4.	Heat-treated steels.	Mar. 6, 1947
5.	Armor plate, heat-treated alloy steel, stress proof steel, die plates.	Mar. 13, 1947
6.	Stainless steels.	Mar. 20, 1947
7.	Semisteel, Ni-Resist, alloy cast iron.	Mar. 27, 1947
8.	Factors governing cutter life, selecting feed rates.	Apr. 10, 1947
9.	Regulating life between grinds, cutter design.	Apr. 17, 1947
10.	Factors involved in good practice.	Apr. 24, 1947
11.	Tool grinding, reconditioning and blade setting.	May 8, 1947
12.	Converting to carbide milling.	May 15, 1947

pendent of all factors except one, namely, the kind of material. No other consideration enters into this specification: The size of the machine, the power available, the type of cutter and cutting and clearance angles have no influence whatsoever on the selection of this all important operating characteristic when effecting a carbide milling operation.

The selection of the sfm rate is based solely on the identification of the material according to the 11 divisions listed above and is consummated in the following manner:

Wrought iron: Select a speed between 900 and 1000 for wrought iron. This recommendation can be considered as a critical factor in the successful milling of this otherwise difficult if not impossible engineering material to mill. High sfm rates are absolutely essential to success with wrought iron.

Low carbon steel 5 to 15 points: For this material (in which classification boiler plate is properly included), a high speed rate must also be selected if machinability is to remain high and cutter life satisfactory. The gummy, stringy nature of these low carbon steels, and this includes wrought iron, makes their milling with carbide an impossibility unless relatively high speeds are used. Otherwise, the chips stick to the cutting blades or tips, and are not ejected from the cutter. The resulting friction heats them to cherry heat and, finally, they weld to the cutter body, the workpiece or the carbide. Choose a sfm rate somewhere between 600 and 900 for these materials.

Stainless steel type 304 without sulfur: For these materials choose a speed rate in the neighborhood of 900, not much lower unless spindle speeds do not permit. Strangely enough, this material that until recently was considered nonmachinable has a relatively high degree of machinability, even in milling, providing only a high surface foot rate is used and the proper cutting and clearance angles, particularly the latter, are specified. This latter important and even critical factor will be referred to later. All other stainless steels are to be placed in the same category as standard steel and treated accordingly. This refers to such types as 303, 305, 310, 315, etc.

Standard SAE classifications: Determine the Brinell hardness number of the standard SAE steels using either the specification sheet of the material for this purpose, or better still, make a Brinell determination with a portable type instrument on the piece as it is about to be milled. (If a number of pieces are to be milled, or a production line setup, such a determination should be made sufficiently often to check the uniformity of the material.) The information given in table X can then be used.

It is most important that the actual Brinell hardness be determined, not guessed at, and that this determination be taken either from the specification sheet, or, as mentioned above, obtained from the results of an actual test. A variation of 10 pct in the hardness determination will, however, influence the correct sfm selection only slightly.

Cast steel: Cast steel is to be separated from forged and rolled steel. It is milled as is any other sand cast material, including cast iron. The surface foot rate has been very well established by experience and practice, balancing this factor against cutter life. The sfm rate recommended for this material is 300. A 10 pct variation either way makes little or no difference, but the selection should lie in the vicinity of 300. The sandy character of the skin, and sometimes a considerably deeper section, determines the rate at which this material can be milled by carbide. Higher rates, as are used for the forged and rolled steels, result in excessive abrasion due to the sandy character and nature of the material. The resulting excessively low cutter life makes the use of such high rates uneconomical.

Cast iron—unmodified: For straight cast iron, that is cast material in the neighborhood of 25,000 to 30,000 psi tensile strength, a speed rate somewhere between 300 and 450 should be specified. The lower bracket can and should be taken when the

TABLE X

Surface Foot Rates for Various Brinell Hardnesses

Bhn	Rate
160 to 180	624 to 593
180 to 220	593 to 536
220 to 300	536 to 447
300 to 420	447 to 338

TABLE XI

Recommended Cutting and Clearance Angles for Various Materials

Material	Cutting Angles	Clearance Angles
Wrought iron	10° PRR 7° NAR 8° PTR	7° OD 0° Dish 15° FCI
Low carbon steel	10° PRR 7° NAR 8° PTR	7° OD 0° Dish 15° FCI
Stainless steel	10° PRR 7° NAR 8° PTR	7° OD 0° Dish 15° FCI
Standard steel	7° NRR 7° NAR 7° NTR	7° OD 0° Dish 7° FCI
Modified cast iron	7° NRR 7° NAR 7° NTR	7° OD 0° Dish 7° FCI
Standard cast iron	10° PRR 7° NAR 8° PTR	7° OD 0° Dish 7° FCI
All ferrous materials harder than 300 BHN	10° NRR 7° NAR 8° NTR	5° OD 0° Dish 5° FCI
Nonferrous materials	15° PRR 7° NAR 12° PTR	7° OD 0° Dish 15° FCI

Note: PRR = Positive Radial Rake
NRR = Negative Radial Rake
NAR = Negative Axial Rake
PTR = Positive True Rake
NTR = Negative True Rake
OD = Outside Diameter
FCI = Face Clearance Angle

material is dirty and filled with blow holes; the higher ones when it is clean.

Modified cast iron: By modified is here meant the admixture of some alloy such as steel to make semisteel or the controlled irons such as Meehanite, Linite, etc. These materials have tensile strengths that begin at 50,000 psi and frequently go as high as 70,000. Here the sfm rate selection is definitely established as at 300 or thereabouts but no higher. The lower rates touch bottom at 250. It is advisable to take a Brinell determination: This is usually between 180 and 220. The specification of the sfm rate can be modified accordingly.

Special cast irons: Chilled or white iron must be classed separately for purposes of planning carbide milling operations. The reason for this is that the Brinell hardness of this class varies from 500 to 700.

For the lower bracket special cast irons use a speed rate of 250; for the higher 100.

Malleable iron: Mill malleable somewhere between 350 and 450 sfm.

Brass and bronze: Mill these materials at rates in the neighborhood of 300 sfm.

Nonferrous materials (aluminum, magnesium, plastics): These materials should be milled at the highest available rate. They have been milled at rates as high as 21,000 sfm. The majority of milling machines currently available have spindle speeds varying between 1000 and 2000 rpm. Hence the surface rate must be pared to the available spindle speed. So far as is known no limit exists on this type of milling.

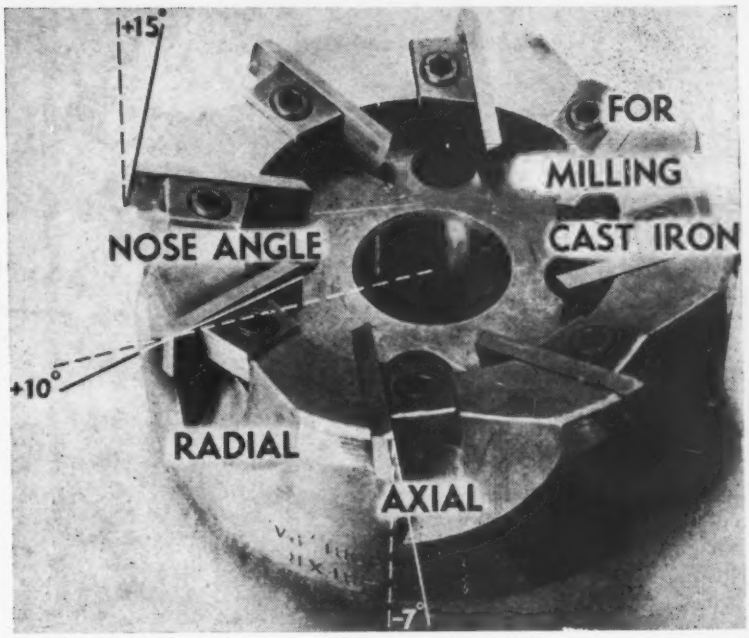


FIG. 70—Cutting angles are specified as true rake which, as shown here, is a combination of the radial, axial and nose angles.

Specifying Cutter Diameter

With the face width of the workpiece known, the cutter diameter can be specified. (If the job is a slotting operation, the size is determined by doubling the depth of the cut and adding twice the distance from the arbor to the top of the workpiece.) An excellent rule to follow is the application of a 5 to 3, or an 8 to 5 ratio between the cutter diameter and the width of the cut to be taken. This insures, with proper setting of the cutter on the bias, that is, the center line of the cutter is set approximately in line with the top edge of the workpiece, that the chip thickness will be at a maximum at the beginning of the cut. Hence the carbide teeth will be subjected to a minimum of abrasive effect.

A further word regarding cutter diameter is necessary: The cutter diameter selected should never be larger than the largest gear in the milling machine. Hence it is seldom advisable to use cutters larger than 12 in. in diameter since bull gears are not much larger. This is an important recommendation and must be followed faithfully for successful milling. Otherwise, the flywheel effect in the cutter will exceed that in the gear and the backlash in the gear train will then be fully effective with each tooth entrance and exit.

Proper selection of cutter also extends to (1) specification of proper grade of carbide, (2) specification of the proper cutting and clearance angles.

Carbide grade specification should be left entirely in the hands of the carbide manufacturers whose published recommendations should be carefully followed.

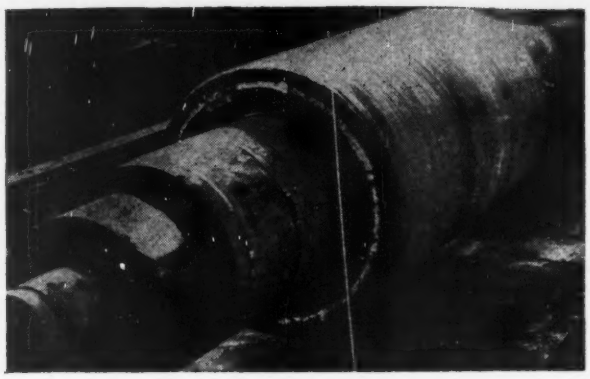
The cutting and clearance angle recommendations shown in table XI are based on proven experience and results.

The 15° face clearance angle for wrought iron, low carbon steel and stainless must be considered as critical. Without this clearance angle cutter life will be disastrously low. Note also that the cutting angles recommended for cast iron harder than 180 Bhn are the same as those for steel. Likewise the cutting angles for steel whose Brinell hardness number is below 160 are the same as for normal cast iron.

All cutting angles are given as true rake which is a combination of the radial, the axial and the nose angle. Fig. 70 will make this clear. The diagram in this illustration happens to refer to cast iron but the following additional explanation will cover all other materials: A 7° negative radial rake angle, with a 7° negative axial rake angle and a 15° nose angle is used to make up a true negative rake angle of 7° for the cutting or milling of steel. Further, a 15° positive radial rake angle with a 7° negative axial rake angle in conjunction with a 15° nose angle adds up to a 12° positive rake angle for the milling of nonferrous materials.

Finally, before selecting a cutter the job should be analyzed carefully to determine the manner of executing it which will require the least expenditure of money and effort for tools and fixtures. In this connection, it is seldom justifiable, since the advent of carbide milling, to apply straddle mills to an operation. A simple face mill mounted on the spindle, either horizontal or vertical, of a standard milling machine will be far more economical, in the vast majority of jobs, than a time-consuming straddle setup.

Worn Mill Rolls Rebuilt by Welding 6½ Tons on Work Face



BELIEVED to be the largest deposit of weld metal ever made in one continuous arcwelding operation, a weld of approximately 6½ tons of alloy steel was deposited on the working face of a scrap back-up roll, shown in accompanying illustration, from a continuous hot strip mill at the Jones & Laughlin Steel Corp.'s Pittsburgh works. The operation, performed by Lincolnweld automatic shielded arcwelding, was in process over a period of 18 days, using a total of 12 passes made at the average time of 40 hr per pass.

The diameter of the roll when it was originally put into operation at the J&L works was 53 in. on a 90-in. working face, and had a rough weight of approximately 82,500 lb. After time and hard usage had worn the roll down, it was dressed to a minimum working diameter of 48½ in. and was, by this time, so badly spalled that it would normally have been scrapped.

Prior to rebuilding the face, supersonic inspections were conducted to detect internal defects, since any decision to rebuild or to scrap depended on these inspections. With this supersonic method of detecting defective mandrels, the program of rebuilding worn faces can be undertaken with savings in time, materials and manhours.

It was demonstrated that an improvement in a welded roll structure could be obtained by a more severe temper from the automatic metallic arc process in steel having a lower alloy content which, therefore, has a lower ratio of work hardenability.

The scrap roll was turned down to a 46-in. diam to remove all visible traces of spall metal and cracks from the surface, and thus prevent any distortion of the facing brought in by successive welding passes. Before welding the roll was preheated to a temperature of 600°F, with the heat applied gently and uniformly at the rate of 5° per hour until 600° was attained. This temperature was then held constant for 24 hr before welding was started.

The first pass was made with a very mild steel electrode to a thickness of ¼ in., adding 925 lb of metal at the rate of 25½ lb per hour, and increasing the diameter by ½ in. Subsequent layers were a chrome-vanadium type alloy and were used to give an analysis somewhat comparable to that of the original material. Each of these passes was also ¼-in. thick. The rebuilt roll has been in service on various stands throughout the plant and has not shown any tendency toward undue spalling.

Producing Lithium in Vacuum

AN interesting application of vacuum, that of producing lithium, was reviewed by W. J. Kroll, consulting metallurgist, U. S. Bureau of Mines, Albany, Ore., and A. W. Schlechten, professor of Metallurgical Engineering, Missouri School of Mines and Metallurgy, Rolla, Mo., in a paper entitled "Laboratory Preparation of Lithium Metal by Vacuum Metallurgy," presented at the recent AIME annual meeting in New York.

Several undesirable features characteristic of the fusion electrolysis process for producing lithium, such as; (1) necessity of supplying costly, low-voltage direct current, (2) collecting and processing the anodic chlorine if it is not to be wasted, and (3) using lithium chloride, one of the most expensive salts of lithium, for an electrolyte, were held by the authors to show the need for a method such as the vacuum process.

Lithium oxide for reduction experiments was obtained by the thermal dissociation of Li_2CO_3 in a vacuum. The use of a vacuum furnace makes it possible to eliminate most of the carbon dioxide at a temperature slightly lower than the melting point of Li_2CO_3.

Lithium metal was readily produced by the reduction of Li_2O-CaO mixtures with silicon or aluminum in a vacuum of less than one micron and at temperatures of 1740° to 1830°F. Under these conditions, recoveries of better than 75 pct of the lithium content of the charge were obtained with silicon as a reducing agent and better than 80 pct with aluminum. The temperature required for reduction with aluminum is lower than that needed with silicon. The reduction of Li_2O with magnesium was not successful in that only 72 pct lithium recovery was realized; further, sufficient magnesium distilled over to contaminate the product markedly.

Lithium carbonate-CaO mixtures could not be reduced efficiently with silicon, and the small amount of metal obtained was severely oxidized. Lithium chloride could not be reduced with silicon in the presence of CaO because of the high degree of volatility of the lithium chloride. Lithium fluoride was reduced in the presence of CaO with aluminum or silicon, but the product was found to be contaminated with lithium fluoride.

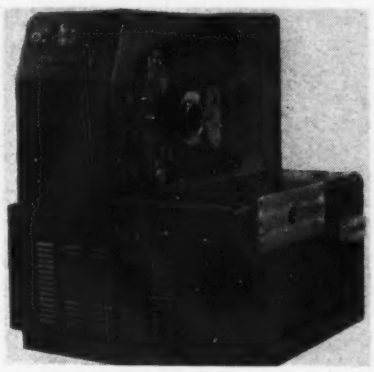
An average sample of lithium metal made by the silicon reduction of a mixture of lithium oxide and calcium oxide in four different runs was said to contain; 0.01 Si, 0.01 Al and 0.04 Ca.

New Equipment . . .

Recent models in stationary cutoff machines, special toggle presses, boring machines, small electric furnaces, automatic small parts inspection units, and compressed air coolers are discussed in this week's review. Also included are various material handling devices, a numbering stamp, and welding torches and rods.

Tube Cutoff Machine

STATIONARY tube cutoff machines having stepless range of speeds and feeds have been developed by the *Etna Machine Co.*, Toledo 10. They are selfcontained units, with drive motor, hydraulic pump and motor, hydraulic cylinders, and equip-



ment mounted within the same base with rotating cutter head. The tube which is held stationary while being cut off, can be fed through either end of the spindle. Removable liners for the spindle and tube clamping jaws are provided to give guiding and clamping of tubes over entire range of the machine. The cutoff cycle is completely automatic; clamps tube, cuts off and unclamps by pushing one button. Automatic hydraulic or electrically operated feeding attachments with precision gaging for length of tube to be cut, and with automatic or semiautomatic cutoff and feed cycle operation and push button control are also produced by the company.

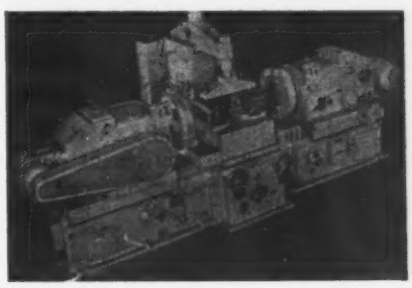
Toggle Presses

DEVELOPMENT of a toggle press line, said to be unique in design as well as in the arrangement of the driving mechanism, for triple action drawing of large automobile stampings in a wide range of capacities and in any widths desired, has been announced by *E. W. Bliss Co.*, Detroit 2. These presses have four point suspension on both the upper slides which are accurately timed and mechanically locked with a crank driven plunger in the bed. The location of the driving mechanism below the bed permits a considerable reduction in the machine's height above the floor, providing a lowered center of gravity. Greater stability is accomplished with increased footing front to back. With triple geared driving mechanism, which consists essentially of motor, drive shaft, and intermediate gearing, the lower plunger is driven by two main crankshafts supported by individual crowns beneath the press bed. The main gears, mounted on the outer ends of the crankshafts, have hubs on each side which are the eccentrics, driving the upper plunger and blankholder mechanisms. Each corner of the blankholder can be power adjusted either independently or can be synchro-

nized with the other three corners. This system of toggle linkage is said to give an unusually long dwell to the blankholder; also a sufficient dwell to the upper plunger to perform redraw work with the lower slide.

Boring Machines

DEVELOPMENT of a boring and facing machine which is said to permit accurate bores in awkward-shaped castings by semiskilled labor, has been announced by the *National Automatic Tool Co., Inc.*, Richmond, Ind. Two

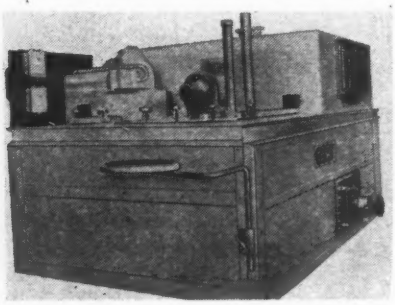


models, the A-20A and A-20B Borface may be mounted horizontally, vertically, or at an angle in fabricating multiway type precision boring machines. The chief difference between the two is an automatic cross-facing drive and control on the A-20B. All A-20 Borface units are provided with heavy-duty spindles mounted on preloaded precision bearings, with worm and gear driven by B belt drive to insure smooth flow of power to cutter bits. The A-20B, illustrated, also permits operating on more than one face at a time for greater precision and to eliminate rehandling or resetting between operations. Both facilitate handling of work too large and awkward to handle or swing on boring mills and lathes. Various types of heads for specific requirements may be employed.

Ball Bearing Washer

DEVELOPED for processing ball bearings, a machine marketed by the *Mabor Co.*, Rahway, N. J., has been designed with particular emphasis on cleaning the hidden areas of the races. The variable speed conveyor of the unit is a link chain affair, wound around

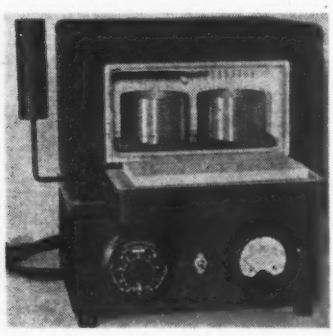
a series of sprockets supporting vertical pyramidal holders which accommodate the ball bearings. The races are rotated continuously by means of the friction strap and the eccentric sprays which are directed between the two races.



These sprays are actuated by two 2-hp pumps. The equipment may be used with any spray treatment, utilizing one, two or three different sprays. From 1500 to 3000 ball bearings in diameters up to 6 in. can be handled per hr in the machine. The same equipment can be utilized for production runs of other parts, it is said.

Small Electric Furnace

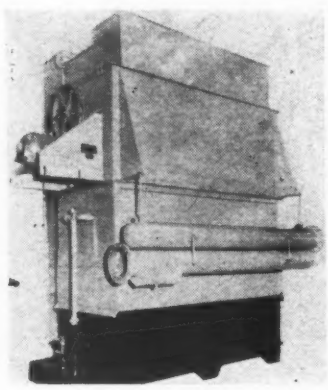
OFFERED for laboratories or experimental shops, the Jelrus TF electric furnace, said to be adaptable to enameling, heat treating, chemical drying, and small scale production work, has been manufactured by *Jelrus Co., Inc.*, 136 W. 52 St., New York 19. The corrugated refractory muffle has



been made wide and shallow to allow the insertion and removal of items without disturbing others. Inside dimensions are 4⅜ in. deep x 4 in. high, with a door opening 9 in. wide. Percentage timers are said to maintain a constant temperature anywhere between 100° and 1800°F, or may be used to regulate the speed of heating to a required temperature. This furnace is designed for 110-120v ac operation.

Compressed Air Cooler

FOR cooling compressed air and condensing and removing the water vapor contained in it, the *Niagara Blower Co.*, 405 Lexington Ave., New York 17, has announced an improved design Aero After Cooler, which accomplishes the evaporative cooling by passing the compressed air through coils in a spray chamber where atmospheric air is drawn through by fans, evaporating a portion of the recirculating spray water. It is said 1000 Btu per lb of water evaporated are removed from the compressed air. The coils are arranged laterally across the spray chamber and the compressed air is introduced through a manifold located lengthwise on the outside of the casing. The compressed air is withdrawn to the receiver through a similar manifold. The friction of the compressed air in the coils is reduced and greater contact with the evaporating spray is secured. Since the compressed air temperature reached is always lower than the dry bulb temperature of the ambient air, condensation of water in compressed air lines and tools is prevented.



Small Parts Inspection Unit

AN automatic hopper-fed roll selector for the inspection of length and diameter of small precision parts such as roller bearings, dowel pins, chain links and similar products has been developed by the *Sheffield Corp.*, Dayton 1. It can be adjusted to permit an infinite number of different sizes of parts within the capacity of the machine to be gaged quickly and with precision, to a tolerance of 0.0005 in., it is said. Its range of adjustment

is 7/32 to 31/32 in. on diameters and from 9/32 to 3 in. on lengths. After setting up the automatic roll selector, using minimum and maximum masters or two parts known to be the correct size, the parts are placed in a hopper. A reciprocating device picks up the units, and by means of a gravity fed slide they proceed to the gaging position. One Electrichek gaging head checks the overall length while two other gaging heads check the diameters at each end. Each part is classified and segregated into one of four classifications and the segregated parts pass into separate bins. The roll selector operates at a fixed speed to check and separate 3600 parts an hr into the four classifications while gaging the three dimensions simultaneously.

Signalling Timers

SERIES S signalling timers, designed to command visual and audible attention the instant a time

interval is completed, has been manufactured by *Industrial Timer Corp.*, 110 Edison Place, Newark 5,

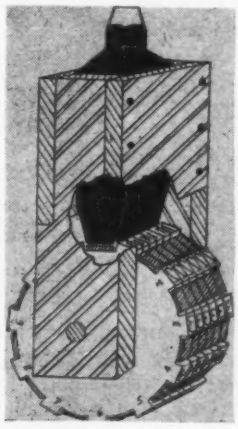
N. J. The timers provide for automatic closing or opening of a circuit at the end of elapsed time, and will operate additional buzzers, bells or lights at remote locations. Units operate on ac, 115 or 230 v, 25, 50 or 60 cycles. Voltage and frequency may be specified. Dial calibration ranges from 1 sec to 5 min and maximum time interval ranges from 1 min to 3 hr. Size of unit is 5 x 5 x 3½ in. deep.

Constant Torque Transmission

KNOWN as a screw shift type, a transmission which can shift into any one of four forward speeds in 1 sec, it is said, and which is readily adaptable to pushbutton control has been announced by the *Wright Aeronautical Corp.*, Wood-Ridge, N. J. It is said the transmission having only half as many parts as present automatic types may be shifted under any condition or speed or load without temporary lag or loss of speed and power. Action in the shift lever moves selector gears forward or backward along a spiral in the main shaft until they synchronize with the desired gear. In this way there is a constant torque on the drive shaft and all shifting is done in a straight forward or reverse motion.

Numbering Stamp

FEATURING a direct-impact principle, a numbering stamp said to impress long serial or stock numbers into hard metals on a pro-



duction basis has been designed by *G. H. Fisher*, 2964 Sequoia Dr., South Gate, Calif. The stamp incorporates a rotary numbering head having a seat which is provided for the punch directly on the type-wheels. The seat is formed by the flats or pads which occur between each number on the type-wheels. This necessitates the use of an odd number of characters, which is achieved by adding a hyphen to the customary 10 numerals. The impact from the punch, which is a piece of tool steel, wedge shaped at the bottom to keep the wheels in alignment and with a chisel head at the top, is delivered to the pads diametrically opposite the actual figures, and without placing any load on the axle, it is said. The impact from the hammer or press is cushioned from the axle by coil springs in the frame.

Anticorrosive Finish

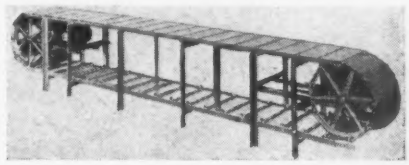
P-5, an anticorrosive Co-Polymer finish, is a series of coatings marketed by the *Watson-Standard Co.*, Pittsburgh 12, for the protection of metal, wood and concrete against corrosion from exposure to moisture, acids, alkalies and other disintegrating elements. The finish is said to be nontoxic and dries rapidly by evaporation. It has good thermal stability, is highly resistant to abrasion and scrubbing and has good aging characteristics, it is claimed. P-5 does not oxidize or become brittle. It is available in nine colors.

Inorganic Cleaner

A GENERAL purpose inorganic cleaner, designed for maintenance work but suitable for industrial washing machines has been announced by the *Pennsylvania Salt Mfg. Co.*, 1000 Widener Bldg., Philadelphia 7. The cleaner, designated Pennsalt MC-1, is a dry, granular inorganic material that dissolves quickly in water, removes most types of soil easily and rinses rapidly. MC-1 may be used in steam gun cleaning of painted or unpainted surfaces. Two to 4 lb is adequate for 50 or 55 gal tank of the vapor spray machines. In tumble barrel cleaning, burnishing or deburring operations the mixture is from 2 to 8 oz for 1 gal of water. Pennsalt MC-1 can be used for metal preparation where a heavy duty cleaner would be too strong. It is packed in 125 and 250-lb plywood drums.

All-Steel Belt Conveyor

STAINLESS steel belt links for use with the company's all-steel belt conveyors have been announced by *Steel-Parts Mfg. Co.*, 222 S. Morgan St., Chicago. These links are recommended for industrial use where corrosive conditions



are severe. They are connected to the next link with a flexible Indian grip of steel, making the insertion of a new plate for cleaning or replacement a matter of minutes. it is said. The entire conveyor is constructed in standard 5 or 10 ft sections. Its surface is flat, non-sag, and has a positive no-slip movement, it is claimed.

Cutting Tool

THROUGH compound leverage, the application of 100-lb pressure gives 4 tons cutting power at the jaws on the Carolus type cutter developed by the *Manco Mfg. Co.*, Bradley, Ill., to replace cold chisels and blow torches for cutting bolts, rod or wire. Features of the new model include drop forged handles for greater strength, socket screws in place of protruding bolts to prevent breakage and bending, and countersunk eccentric head strap bolts on the head which maintain factory-set tension. The cutter is equipped with a two-way cutting jaw providing both side and end cutting action, enabling the operator to cut remotely located bolts. These cutting jaws are also available in a three-way combination incorporating a nut splitter.

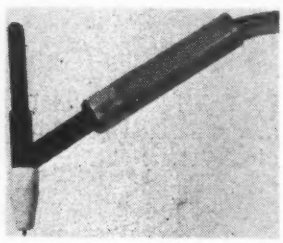
Cast Iron Solder Rod

SAID to combine ease of application with satisfactory results, a cast iron solder rod for repairing cracks on cast iron has been announced by *All-State Welding Alloys Co., Inc.*, 96 West Post Rd., White Plains, N. Y. This rod is said to produce corrosion resistant welds and to repair cracks in cast iron which must be water-tight and pressure-tight against pressures up to

1000 psi. It can also be used for sealing and filling cracks and blowholes and for building up where strength is not required. It melts at a very low temperature, 600°F, and tins easily and rapidly. This No. 7 cast iron rod is used with All-State No. 7 flux, except for brazing dissimilar metals to aluminum, where All-State No. 53 flux is used.

Water-Cooled Welding Torch

A WATER-COOLED Heliarc torch designed for inert-gas-shielded arcwelding of metals such as stainless steel, aluminum, Monel, Inconel and magnesium, has been announced by the *Linde Air Products Co.*, 30 E. 42nd St., New York 17. Water-cooling on this model which is designated the HW-4, is said to make possible the use of an unusually light and flexible power cable capable of carrying 250



amp. Water flows through the torch and handle and out around the power supply cable. A safety fuse inserted in the water discharge line shuts off the power if circulation stops or if the torch becomes overheated. Dc, straight or reverse polarity, or high frequency stabilized ac can be used. The gas cup is made of an insulating ceramic material to prevent accidental arcing to adjacent parts of the workpiece or jig. The electrode is tungsten.

Fork Truck Pusher Device

ADAPTATION of a pushing device to a standard fork truck has been announced by *Clark Tructractor, Div. of Clark Equipment Co.*, Battle Creek, Mich., which makes fork lift trucks capable of automatically picking up all types of materials, lifting them, tilting them, stacking, tiering, dumping and unloading them onto the floor with a gentle push. The pusher is said to be practical for nearly any type of load. Retainers are used to hold the pallet in the job, but loads may be deposited with the pallet if desired. The pusher can be used with selfcon-

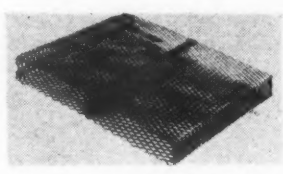
tained loads which do not require a pallet. It has a maximum stroke of 52 in. and a thrust capacity of 4000 lb.

Abrasive Sticks

A LINE of fine, medium and coarse grained abrasive sticks suitable for cleaning, deburring, finishing or polishing operations, has been introduced by the *Sandusky Abrasive Wheel Co.*, 693 W. Ransom St., Kalamazoo, Mich. It is stated that these sticks are easily shaped with a knife, file, grinding wheel or saw and may be cut on the job to fit the work. They do not load or glaze, it is said, and may be used dry or with water. The sticks are available in 3, 6, and 8-in. lengths.

Expanded Metal Pallet

COMBINING light weight and tough serviceability through the use of expanded metal, a pallet offered by *Phillips Mine & Mill Supply Co.*, 101 Jane St., Pittsburgh



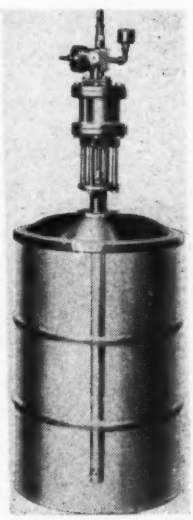
3, is said to provide effective load holding deck friction. The pallet is constructed of 13 gage material with ½-in. openings, and will accommodate approximately 3000 lb load weight. The company has also added a wood deck steel-bound pallet to its pallet line.

Duplicating Attachment

CALLED the Duplimould, a hydraulic duplicating attachment that can be built for any vertical milling machine and is said to control all the feeds, longitudinal, cross and vertical, with one tracer, has been developed by the *Clinton Machine Tool Co., Inc.*, Clinton, Ind. The pencil tracer valve controls the table movements any way the tracer tip is moved, giving a true three dimensional control, it is said.

Drum Pumps

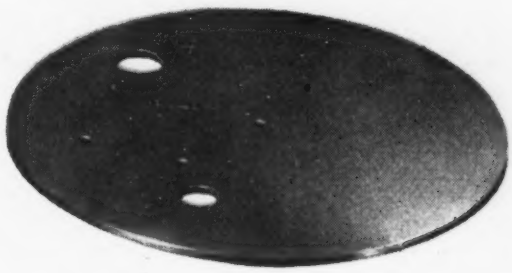
DESIGNED to pump lubricants, sealing materials, paints and other materials directly from standard 55-gal drums, two types of pumps offered by *Aro Equipment Corp.*, Bryan, Ohio, are available in seven pressure ratios, from 40:1 to 2:1. These pumps operate from compressed air. They are available in drum-cover types for full opening drums, and in bung - bushing types for mounting in drums equipped with 2-in. bung holes.



Plastic Aprons

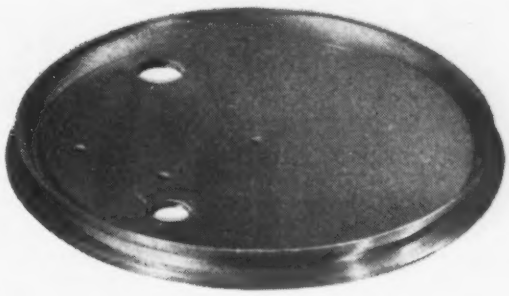
A LINE of protective apparel announced by the *Industrial Products Co.*, 2820 N. Fourth St., Philadelphia 33, includes Nitroflex aprons and sleeves, made of a multipurpose, clear, frosted plastic material for protection against most acids, caustics, oils and solvents. They are light and flexible, yet said to resist snagging, abrasion and wear. All seams are made by electronic sealing, giving the equivalent of a one-piece construction. Sleeves are 14 in. long with adjustable elastic bands at both ends. The apparel is made in light, medium and heavy weight materials.

UNUSUAL METHOD OF FLANGE FORMATION



Step 1.

Discs are cut from brass squares, and holes punched for the fittings.

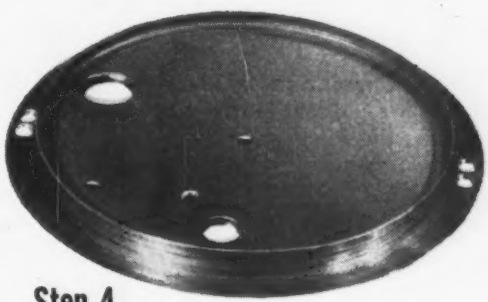


Step 2.

A slot is machined in the edge of the disc. Cutting tool is so designed that it deforms the metal on one side of the slot.

Step 3.

The deformed edge is rolled up to an angle of 90° with the disc.



Step 4.

The flange is machined down to the proper height, which automatically removes the slight puckers that appeared on the edge during the previous operation. Top is subsequently polished and nickel plated.

...A CASE HISTORY BY REVERE

THIS interesting method of producing an integral flange was originated by the Empire Milking Machine Co., West Chester, Pa. The part is a top for its milking machine pail... Revere takes pride in its collaboration on the project. The combination of cutting and deformation required special qualities in the metal; Revere recommended Cartridge Brass, Alloy No. 161, and specified the temper. The proper tool angles were worked out with the customer, and the third operation was changed from spinning to rolling. Thus rejects were reduced to practically zero, and manufacturing time and costs were lessened... If you have a problem in metal selection and fabrication, Revere will gladly place it in the hands of its Technical Advisory Service.

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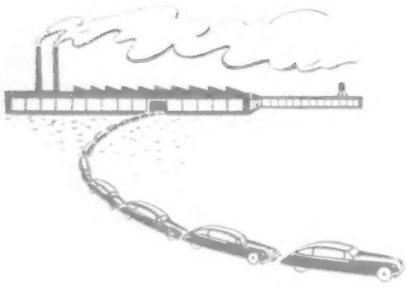
WALTER G. PATTON

• Possibilities for a 5 million car year grow dim as the auto industry faces more steel shortages . . . FAA foremen vote to walkout at Ford . . . Packard raises prices.



DETROIT—Current shortages of steel for auto production have greatly intensified the industry's thinking about its 1948 models.

Several theories have been advanced to explain this new interest in a model change. One possible explanation is that producers want to be certain to have on hand adequate supplies of steel to make preliminary part runs prior to actually going into production. Another theory is that car producers, faced with a series of possible interruptions due to steel shortages, may have concluded that it will be absolutely essential to build up and rebalance their steel supplies before attempting to start a production run on their 1948 models.

One report has it that a major auto producer depleted its stock of steel by more than 30 pct during the last 3 months of 1946 and this process has been continued at an accelerated pace during the first quarter of 1947 while production has been holding close to the 100,000 level.

Immediate effects of the steel shortage may be judged from the fact that at one time this week 40,000 auto employees were reported temporarily out of work because of plant shutdowns. Many of these workers have now returned to their jobs, however. Ward's has estimated output for the week at 83,000 units as compared with 94,000 units assembled the previous week and 101,000 cars and trucks reported for the week ended May 3.

The immediate loss of production, poor prospects for future supplies of steel and disappointing reports about new steel facilities currently being installed have washed out the hopes of many auto executives for a 5 million car year during 1947. The capacity of the industry is such that a 5 million goal could be reached *if* the materials and supplies were available. However, with the steel situation what it is and other shortages just around the corner, predictions of a 5 million car year in 1947 had all but vanished this week as the industry tried to piece together its available supplies and keep the wheels turning on its assembly lines.

At the present time, the outlook for the new Great Lakes mill with an estimated capacity of 500,000 tons is not reassuring. A strike by building trades begun May 1 has halted work on the new Great Lakes building. Original plans called for operation of the new facilities in June but the present delay and difficulties experienced in obtaining electrical equipment have already set back the date of completion beyond August. It was originally expected that the new Great Lakes facilities would relieve much of the steel shortage in Detroit auto plants.

IT IS quite possible that the steel shortage has been the most restraining factor in heading off the foremen's strike at Ford's which was originally scheduled to begin May 17. The Ford chapter of Foremen's Assn. of America had voted to call a strike if no agreement was reached by May 17 but this deadline was allowed to pass without taking strike action. As THE IRON AGE went to press, negotiations between the company and the union were being carried on.

While it is expected that Ford will attempt to operate the plant despite a promised walkout by an estimated 3700 foremen who are members of the union, past experience has indicated that the company's efforts are not likely to be outstandingly successful.

Project Deferred

Detroit

• • • The proposed Chevrolet "lighter" car project has been indefinitely deferred due to a continuing material shortage, both for new plants and car production and the desire of the General Motors Corp. to devote all of the productive facilities and available materials of the Chevrolet Motor Div. to meet the demands of the motoring public for the established line of Chevrolet vehicles, according to a GM spokesman.

Members of the UAW-CIO will report to work as usual even if a strike is called. However, their instructions will be not to perform any of the duties customarily assigned to foremen.

In a letter to Robert H. Keyes, FAA president, John S. Bugas, director of industrial relations at Ford has practically challenged the union to call a strike. In his letter Mr. Bugas declined an invitation to attend a meeting of the Foremen's Assn. which Ford said was widely advertised as a "strike rally." Mr. Bugas also pointed out that the company did not propose "to be pressured into arrangements with the union which the company knows from experience will not work."

"Nor do we propose to give up the idea, now or ever," he said, "that foremen are an integral part of our management team and that they therefore share management responsibility."

"However," Mr. Bugas concluded, "if you disagree on either of these points—that is, if you think by a strike you can force the Ford Motor Co. into some agreement which we know is not workable, or if you think a foreman has no management responsibility, perhaps it is as good a time as any to settle these issues."

Robert H. Keyes, national FAA president, admitted that one possible deterrent to the walkout was the critical steel shortage. The steel supply situation at Ford is known to be on a day-to-day basis but there is no immediate indication of a shutdown because of a steel shortage.

Major points in dispute between

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Pratt & Whitney

Division **Niles-Bement-Pond Company**

West Hartford 1, Connecticut

Ford and FAA are the extension of FAA bargaining rights, dues checkoff, inclusion of general foremen in the union and seniority as a basis for promotion.

UNABLE to hold the price line, Packard has increased the price on all models from $75 to $224 "with sincere regret."

The Packard announcement followed disclosure of a first quarter net loss of $1,148,172.

"Packard would have lost at least $2 million additionally on 1947 models alone in an attempt even to 'hold the line' under the old price schedule," George T. Christopher, president of Packard announced.

It has been disclosed that Packard's assembly lines were idle 28 out of 63 working days in the first quarter because of materials shortages. Instead of building 17,800 cars as originally scheduled for the period, Packard assembled only 11,710, a spokesman for the company reported.

The price increases "give consideration to wage increases sought by the UAW-CIO as well as to rises in material costs which the company has been unable to absorb, with production restricted so sharply," according to Packard officials.

While there are no immediate indications that other car producers will follow Packard's example in raising prices, the combination of recent wage increases and restricted output appear to have just about knocked out any possibility that other car producers will shortly announce price cuts.

A brief announcement appearing in a Detroit paper recently scarcely received the attention it deserved. The notice was to the effect that Richard T. Frankensteen, former UAW-CIO vice-president, and now assistant general manager of Allen Industries, Inc., of Detroit, automobile upholstery manufacturers, helped to negotiate a contract with Local 857, UAW-CIO, as a company representative. He signed a contract for the company on the basis of a 10¢ hourly blanket wage increase.

Hudson Motor Car Co. has agreed to the equivalent of a 15¢ hourly wage increase to 14,000 hourly paid employees. Following ratification by Local 151, UAW-CIO, the increase will be retroactive to May 9.

The General Motors wage adjustment seems well established as a "pattern" so far as the auto industry is concerned.

GM First Quarter Net Profit Is $65.8 Million

Detroit

• • • **General Motors** net income for the first quarter of 1947 totaled $65,818,019 or $1.42 per share on the common stock outstanding. Net sales of all products for the same period aggregated $804,853,209, a figure which is "much greater than would be indicated by the volume of cars and trucks alone, since the proportion of the sales of all other products to total sales was at an abnormally high level for peacetime years," according to Alfred P. Sloan, Jr., chairman of the board.

Spokesman for the corporation pointed out "that production and sales during the fourth quarter of 1946 were increased by drawing more steel from inventories than was being received. Consequently, sales in the first quarter of 1947 reflect limitations on production resulting from the lowered inventories of steel and continued shortages in deliveries of steel."

Aluminum Castings Save 500 lb in Tucker Engine

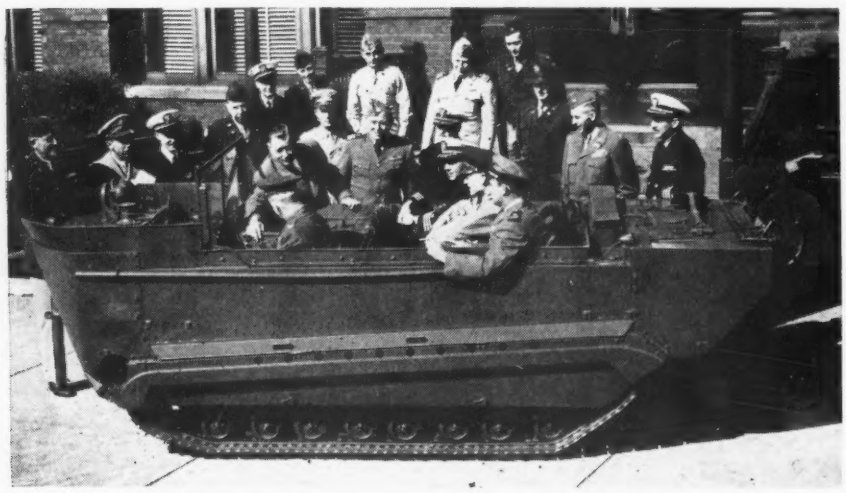
Chicago

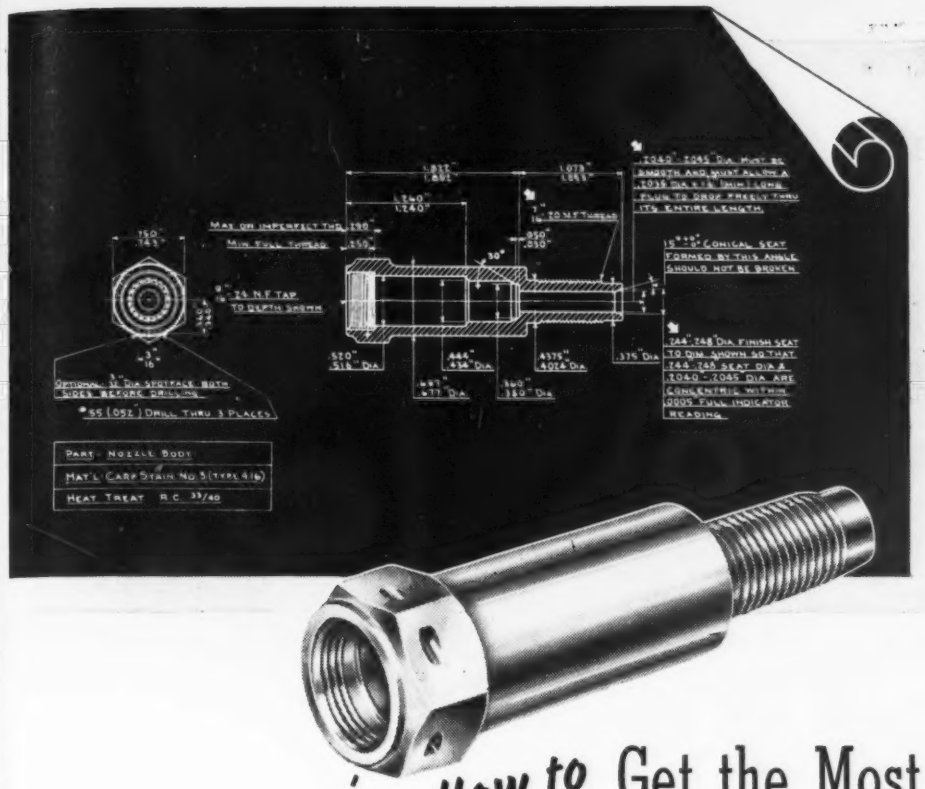
• • • **More than 500 lb** lighter than a conventional engine with comparable power and performance, the engines for the Tucker Torpedo car will reduce weight by the use of aluminum castings for crankcase, block and heads. The Tucker is an opposed aircraft-type engine, with opposing cylinder-banks offset and a six-throw crankshaft for a power flow that is smoother than a V-8, which has only four throws for eight cylinders. Opposed design permits tranverse placement in the rear without affecting road clearance or adding vertical bulk.

The engine will develop 150 hp at 1500 rpm, compared to approximately 4000 rpm for the majority of conventional engines in the same power range. Idling speed is reduced to under 100 rpm, compared to 400 to 500 rpm for the conventional engine. The increase in torque at low engine speed is achieved through the use of high frequency ignition and fuel injection, plus a precision balanced crankshaft that takes power directly from each end to the wheels.

Valves are actuated hydraulically with oil in the engine's lubricating system, so that if oil drops to a danger level valve action stops and the engine will go dead before bearings or other parts can be injured.

SCHOOL DAYS FOR THE ARMY: *High ranking military and naval officers who are students at the Industrial College of the Armed Forces are making a first-hand study of American manufacturing methods. At South Bend the officers looked over the famous Weasel, an amphibious vehicle developed by Studebaker during World War II. Studebaker engineers are shown here explaining wartime design and production problems. Future inspection trips are planned to* 41 *U. S. plants as part of a* 10*-month training course for selected officers of the Armed Forces.*





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Washington . . .

L. W. MOFFETT

•WAA Administrator Littlejohn may stick to job if definite liquidation date is set . . . Supreme Court rate decision does not directly affect steel.

WASHINGTON — Rumors persist that WAA Administrator Robert M. Littlejohn is about to resign. While the former Army officer has no comment to make on the subject, it is no secret that he has little liking for his postwar assignment. It has given him more trouble, criticism and headaches than his wartime task of supplying a 3½-million man European Army with the same 700,000 different kinds of items which he must now sell as war surplus.

Best opinion is, however, that there will be no immediate change in the administration of WAA although General Littlejohn would like to retire to private life. One reason is that few, if any, qualified businessmen would be willing to subject themselves to the rigors and grief that the task entails. Also, informed sources say, General Littlejohn will agree to finish up the job provided the government will agree to (a) set a cut-off date for declaration of surplus (September or October 1947) and (b) establish a definite date (July or August 1948) on which WAA would close shop as such and turn over to the Bureau of Federal Supply (formerly Treasury Procurement) the remaining organization and surpluses.

The agency now appears to be in high gear, having disposed of nearly $16 billion worth of the foreseeable $29 billion war surpluses. Since the beginning of 1947, disposals have been at the rate of $1 billion a month which would indicate that by next July the accumulation will have dwindled to a total which could be easily handled by the BFS, the agency normally handling peacetime surpluses.

One definite and one probable factor tend to adversely affect the hopes of liquidating WAA by the middle of next year. The first is the changing economic trend. Where there was formerly a scramble for surplus stocks because of shortages of new production, scarcities are now being gradually overcome in many lines with the result that buyers are turning more and more to commercial sources rather than to government holdings. Also, the cream of the surplus stocks have now been picked over leaving the less desirable goods for disposal.

ESPECIALLY is this true in the capital and producers goods and real property categories. Many of the remaining war plants are rapidly becoming white elephants because of their size, their location, or other economic reasons. For example, all bids on the Alcoa aluminum plant at Torrence, Calif., had to be turned down and WAA is now faced with the necessity of dismantling and removing the machinery and equipment; in this instance, a likely bid by Permanente had to be rejected because it was contingent upon assurance by the government of sufficient operating power at reasonable cost — a guarantee that WAA could not provide.

Also, sales of both consumers and producers goods have met such buyers resistance so far this year that the rate of return tobogganed from 32 pct of acquisition cost during the last quarter of 1946 to 25 pct for the first quarter 1947. Even lower returns are indicated for the future in this classification.

The second important factor—one which WAA officials privately admit is causing them a great deal of concern—is an additional $5 billion in surpluses which the military services are holding in reserve pending legislative disposition of their plan for compulsory military training. Should Congress definitely turn thumbs down on the idea—and proponements of such legislation now see little or no hopes of the national legislation passing such a law in spite of resumption of quiet lobbying for it —the net result will be the dumping of the additional billions upon a declining market and could conceivably prolong the existence of WAA for several months beyond the hoped-for target date now set for liquidation.

BE that as it may, the domestic surplus disposal job has been more than half completed. As of Apr. 1, General Littlejohn reported that disposal had been made of $16.3 billions of surpluses, ranging from thumbtacks to war plants and whole towns. This leaves inventories amounting to a little less than $9 billion with foreseeable future declarations of another $4 billion (exclusive of the previously mentioned $5 billion held by the services).

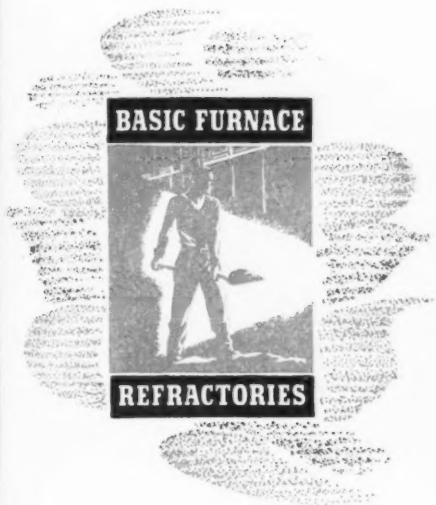
Status of government surpluses in some of the major categories as of the end of the first quarter were:

Real property: Cumulative disposals through March of $4 billion, a return rate of 46 pct of original cost, of which $1.2 billion worth was sold in 1947, nearly three times the amount for the highest previous quarter. A total of $7.3 billion worth has been declared, leaving the remaining inventory standing at $3.3 billion.

Machine Tools: Through the first quarter 1947, approximately 370,000 machine tools had been turned over to WAA and, in addition, it is expected that some 180,000 remain to be declared. Disposals have amounted to 170,000, including 10,000 already set aside for standby storage at the request

★

SETS FAST, STAYS FAST



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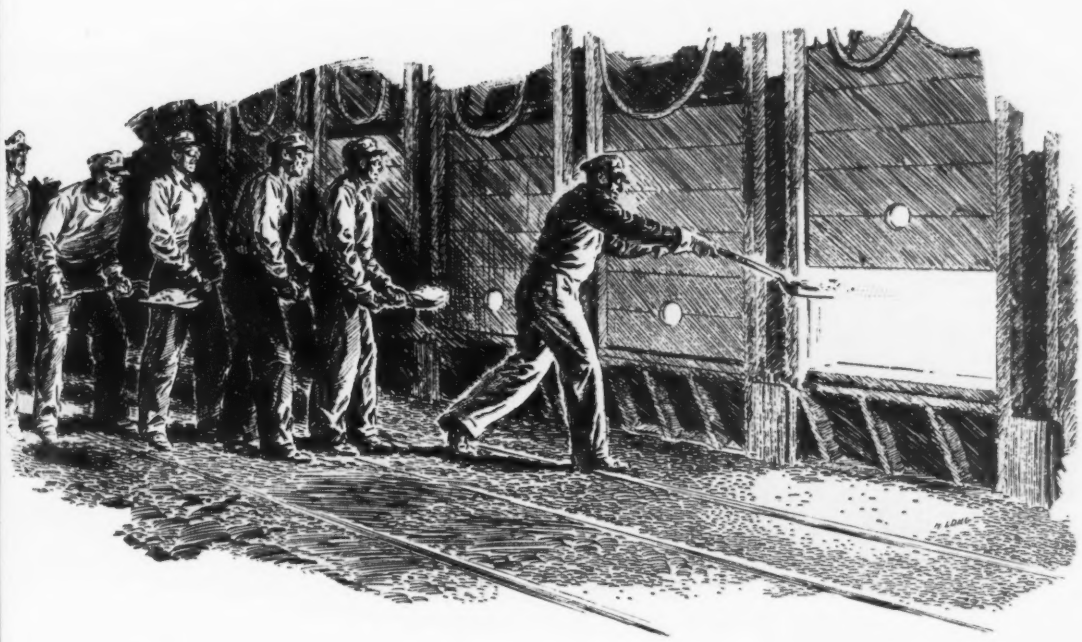

Basic Refractories Incorporated 845 HANNA BUILDING, CLEVELAND 15, OHIO

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of the military services. WAA expects to earmark an additional 61,000 for Army-Navy set-asides, leaving the agency faced with future disposal of approximately 310,000 units.

Consumer and Producer Goods: Two-thirds of the $8.7 billion declarations, or $5.7 billion, have been disposed of. About $1.6 billion was sold during the past quarter, leaving an inventory of slightly less than $3 billion. Rate of return has dropped to 25 pct.

Aircraft and component parts: Disposals are about 80 pct complete in this classification; of $7.4 billion in declarations about $5.6 billion in disposals have been made, leaving an inventory of $1.8 billion. Some 98 pct of convertible (to civil use) and 97 pct of tactical aircraft have been disposed of.

Electronics: About $224 million worth of acquisitions totaling some $663 million have been disposed of, leaving about $435 million still in inventory. Demand is growing less for this type of goods.

Vessels and maritime property: Acquisitions totaled some $122 million in marine property of which the Maritime Commission had disposed of $109 million before turning the job over to WAA at the beginning of the second quarter 1947, leaving an inventory approximating $13 million.

THE 63-page Supreme Court majority decision, written by Justice Douglas, upholding the Interstate Commerce Commission's class rate interim order of May 1945 will have no vital direct bearing on iron and steel shipments since most of them take commodity rates. It will, however, call for readjustment of rates on such lines as machinery and equipment.

The court decision means that there will be a general increase of 10 pct in class rates within official classification territory and a like decrease in the South and West, except mountain-Pacific territory which is not affected. The ICC order was to have become effective Aug. 30, 1945, but the prolonged delay in these intricate proceedings grew out of appeals of nine northern and six New England states and 33 railroads.

The 7-to-2 ruling, marked by sharp dissents by Justices Jackson and Frankfurter, affirmed the decision of a Federal Court in Utica, N. Y., in May 1946 which also supported the ICC order. The lower court, however, issued an injunction holding up the rate adjustment until the case could finally be passed upon by the Supreme Court.

The ICC interim order was intended only as a measure of temporary relief until a uniform classification of freight rates can be established by the carriers. Actually class rates at present apply only to a small portion of all rail traffic. Establishment of the nationwide uniform classification, however, will call for a thoroughly revised scale of class rates that will cover much more traffic than they do now.

Readjustment of rates as the result of the Supreme Court's decision will require considerable time. First the court probably not for a month, will issue an order to the lower court directing adherence to the ICC order. Next the carriers will have the tremendous job of preparing and filing the new tariff and they say they do not know how much time that will take.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

THEY'RE HAVIN' TROUBLE WITH A KID'S WAGON--I GUESS HE DOESN'T WANT TH' WIFE AN' KIDS TO SEE HIM HAVIN' TROUBLE WITH IT AT HOME!
AND HE'S TH' GUY THEY SEND ALL OVER EVERYWHERE TO PUT UP TH' BIGGEST CRANES IN TH' WORLD! BUT THEM KIND HAVE TROUBLE PUTTIN' UP A LUNCH!
5-23 J.R.WILLIAMS
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STUMPING THE EXPERTS

Bureau Investigates Coking Coal Reserves

Washington

• • • **Dr. R. R. Sayers,** Director of the Bureau of Mines, in releasing a progress report said that large reserves of Colorado coking coal considered suitable for use in the West's war-developed steel industry are being investigated by the Bureau. The deposits are in Coal Creek District, Gunnison County, the beds varying in thickness from 3 ft 9 in. to 14 ft 10 in. A preliminary estimate of reserves, Dr. Sayers stated, indicated 65 million tons of coking coal and 35 million tons of noncoking coal, a total of 100 million tons of coal, of which 70 to 80 pct was considered recoverable. Carbonizing tests made by the Bureau, it was stated, disclosed that coke from these coal beds was of metallurgical grade.

A copy of Report of Investigation 4104, "Investigation of Coal Deposits in the Coal Creek District, Gunnison County, Colo., Progress Report 1," may be obtained free from the Bureau of Mines, Dept. of the Interior, Washington 25.

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Manual inspection of piston rings is not only tedious and costly but its effectiveness depends to a great extent on the skill of the inspector. However, unless the inspection is accurate and every ring falls within tolerance limits, either the assembly of the motor or its performance is jeopardized.

Sheffield has eliminated these obstacles by developing equipment for both users and manufacturers according to their individual needs.

Typical is the automatic gaging machine shown in Figure 1 now being used in a large automotive plant which inspects and classifies 2400 piston rings per hour on the basis of gap width (to a tolerance of .007") and ring thickness (to a tolerance of .0005"). Classifications are:

1 *rejects for oversize gap*
2 *rejects for undersize gap*
3 *rejects for oversize thickness*
4 *rejects for undersize thickness*
5 *acceptable gap and thickness*

All the operator has to do is to feed the machine and remove the inspected rings from each classification chute.

The automatic unit in Figure 2, which serves an aircraft engine manufacturer, automatically inspects both gap and periphery of piston rings and segregates them accordingly.

The manually loaded electronic Piston Ring Inspector (Figure 3) also checks both periphery and gap at a speed of less than 5 seconds per ring.

If you have mass inspection operations where dimensional tolerances are critical, *chek with Sheffield* on automatic equipment to reduce costs and increase the effectiveness of inspection.

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West Coast . . .

ROBERT T. REINHARDT

• Labor problems dominate thinking of southern California businessmen as ASWA holds 38th convention . . . Geneva Steel Co. gets taxation assessment figure . . . Strikes hit Pacific Northwest.

LOS ANGELES — Businessmen in general and those concerned with the distribution of steel in particular last week gave more than the usual time and thought to labor problems.

Delegates to the 38th annual meeting of the American Steel Warehouse Assn. heard some strong talk from outspoken William M. Jeffers, vice-chairman, Union Pacific Railroad, who drew heavily on his Washington experiences as rubber czar to explain his views on government "interference" in labor matters.

Reese H. Taylor, now president, Union Oil Co. and president of Consolidated Steel Corp. from 1934 to 1938, told the warehousemen how his company engaged in an advertising and public relations program to educate the American people on the facts of so-called "big-business."

William B. Seymour, Jr., assistant vice-president, Joseph T. Ryerson & Son., Inc., told the conference about experiences in his own organization on the solution of labor problems and recommended procedures to others to follow to bring about the return of the open shop and more harmonious and mutually beneficial relations between employers and employees.

Members and guests of the National Assn. of Manufacturers at its regional meeting here heard Clarence B. Randall, vice-president, Inland Steel Co., Chicago, and chairman of the NAM industrial relations policy committee, condemn management for placing expediency above principle when it lends support to a closed shop which he defined as "every form of compulsory union membership."

"Our forefathers did not come to New England to create a system whereby the majority can kick the minority around," Mr. Randall said, "I say that so long as there is one man in any plant who, in the exercise of his own conscience and judgment prefers not to join a union, he must be protected in that right."

From the views publicly expressed by these speakers and from interviews with other business leaders, it is possible to draw a general conclusion that businessmen are a little tired of being pushed around by both labor and government; that they are getting to the exasperation point of being willing to take time and effort away from production problems to find out what can be done in defence of free enterprise; and that they are willing to make sacrifices of time and money to retain or regain control of their businesses.

It is interesting to note that "education" of the country's youth was advocated by several of the so-called "conservative" business leaders as the long-range solution to the problem of economic labor peace and prosperity, and that the same method of attack was supported in a private interview by a small, but successful, business man with very "liberal" leanings. Apparently, the industrial peace of the future rests on the shoulders of the school teachers of today, and the phrase, "The hand that rocks the cradle rules the world" takes on a new meaning.

Members of the American Steel Warehouse Assn. in convention here last week, were taken on a tour of local warehouses including those of A. M. Castle & Co., Ducommun Metals & Supply Co., Earle M. Jorgensen Co., Percival Steel & Supply Co., and Joseph T. Ryerson & Son, Inc. Frequent comment from eastern delegates was to the effect that most of these warehouses had more steel on their floors and in racks than they had since 1941. One of the western warehousemen pointed out that perhaps that was because turnover here was not quite so rapid as that in eastern warehouses where the steel didn't even get on the floor but was unloaded from gondola rail car directly to waiting trucks.

SALT LAKE CITY—After several weeks of negotiations between Utah tax officials and representatives of the Geneva Steel Co., assessed valuation of the Geneva plant and the Ironton plant has been fixed at $22,183,036 for 1947. The Ironton plant has been assessed at about $1,250,000 in the past. The valuation placed on Geneva was therefore a little less than $21 million.

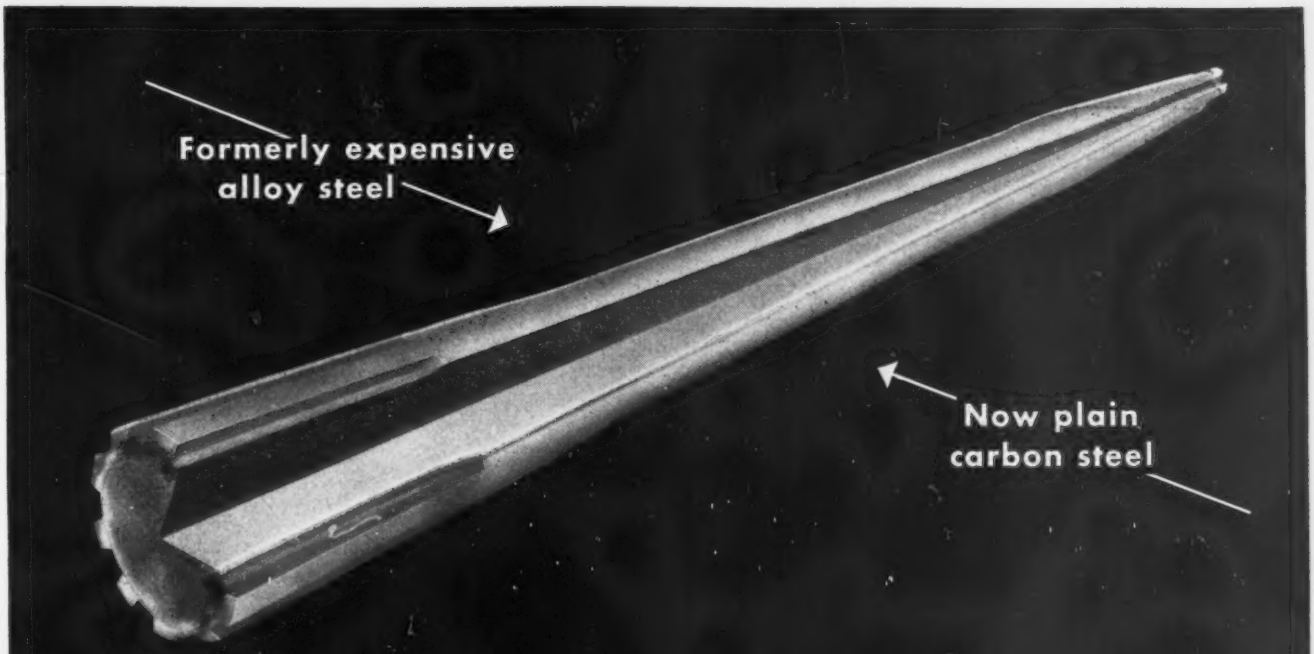
The amount was seven or eight million over the original proposal of Geneva officials but some $15 million under the first figure suggested by the Utah county assessor. While the valuation was fixed at the county level, members of the state tax commission participated in the negotiations. It is understood that the steel company will not protest the assessment.

The valuation figure does not include the Geneva coal mine or iron ore properties, which are in other counties of the state.

* * *

United Steelworkers of America, Local 2701, which recently became the bargaining agent at Geneva after winning an election from the AFL, has signed a contract with the company extending to Apr. 30, 1949, but reopenable in one year on wages. It follows the pattern of the national agreement, with 12½¢ straight wage and 2½¢ in miscellaneous benefits.

Signing of the agreement was delayed by a dispute over retroactivity of adjustments of intra-company inequities recently granted by U. S. Steel Corp. These adjustments were made retroactive to last Mar. 9, a compromise between the date the CIO took over under an interim agreement and the date the union was officially certified as the bargaining agent.



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The $920,000 bid of the Emerald Mining Co. of Elko, Nev., for the alumina plant here, built by the government and operated during the war by Kalunite, Inc., has been approved by WAA's real property review board, subject to acceptable financial arrangements being made by the bidding company.

The mining company proposed in its bid a down payment of $184,000 within 60 days of the acceptance of the offer and annual payments of $184,000 plus interest at 4 pct on the unpaid balance. The Elko firm said in its offer that it planned to use the plant for the refining and processing of various metals including beryllium, lead, chrome, mercury and uranium oxide.

Emerald was the high bidder. Other bids were submitted by Sterling Chemical, Inc., of New York and J. R. Simplot Co. of Caldwell, Idaho, both of which intended to use the facilities for the production of commercial fertilizers.

* * *

Despite the national pattern of wage settlements at around 15¢ an hr increase, the recently organized U. S. Smelting, Refining & Mining Co. council of the CIO International Union of Mine, Mill & Smelter Workers has presented a demand of 25¢ per hr to the company. Other benefits in the way of vacations, holidays and shift differentials are sought.

Utah racked up a first quarter payroll (covered by unemployment insurance) of $64 million. This was the highest first quarter payroll in history, although it has been exceeded in four prior years in the last quarter. The top was $72 million for the last quarter of 1942.

The industrial payroll for the first quarter of 1941 was $25 million, less than 40 pct of 1947's first quarter. Average wage in 1941 was $106. Average for the first quarter of 1947 was $175.

SEATTLE—Six paid holidays and 2½¢ an hr were the major differences between employers and employees which took 10,000 workers away from their benches last week and paralyzed the major metalworking industries of the area.

The striking unions are those which have been negotiating with the Washington Metal Trades, Inc., which represents approximately 100 metal fabricating plants. Independent shops have met union demands and are operating without interruption. Union representatives claimed that approximately 70 pct of the shops in Seattle had signed with them and includes the Continental Can Co. which bolted the WMT and negotiated on its own. This company is one of the largest employers of machinists.

It is estimated that if the strike lasted as much as one week, more than a year would be required for workers to make up their losses from the gains for which they are striking.

The ten unions involved in the walkout were determined last week to carry on their strike until their demands had been met and leaders stated, "If any break in the situation develops it will have to come from the employers." The ten unions involved are: Machinists, foundry workers, molders, welders, warehousemen, iron workers, blacksmiths, boilermakers, auto sheet metal workers and the auto mechanics.

Efforts of Mayor William F. Devin to prevent the walkout were unavailing and his appeal to both labor and management to arbitrate met with but little support. In a telegram addressed to both parties, Mr. Devin said, "In view of progress you have made in negotiating the slight differences between you and the tremendous loss to both sides and to the public in event of work stoppage, may I urge you both in the public interest to agree to arbitrate or mediate remaining differences. I am confident both sides will gain much by such action."

DENZIL HAILEY, representative of the employer group, said on the eve of the walkout, "We realize that a work stoppage of the magnitude threatened here would cause nothing but tremendous loss to the workers, employers and to the community at large."

I. A. Sandvigen, business agent for the machinists, said, "I think it was unfair of the Mayor to send a wire at this time. By tomorrow night (May 16) we will have reached agreement with shops employing a majority of the machinists. The Mayor's wire could do nothing to help the employer group, and probably will discourage some of the employers willing to sign with us. It looks like Mayor Devin is taking sides with the minority in this case."

Earl Lawrence, business agent of the iron workers, said, "Seemingly the Mayor is a little late. His wire should have come before the contract expired on Apr. 1. Otherwise, we are still willing to discuss these problems with our employers as we haven't given up hope. We are not overlooking a bet in trying to keep the men on the job and in the shops."

Neil Pardo of the molders' union said, "We have already lowered our demands from 20¢ an hr to 12½¢, plus 6 paid holidays, in an attempt to settle on a new contract. I personally don't feel that we can arbitrate on our rock bottom offer. We actually believe we are entitled to the national wage pattern, which averages from 15¢ to 16¢ an hr increase."

Machinists in a counter proposal have asked for 12½¢ an hr, retroactive to May 1, and a graduated vacation schedule leading up to a 2-weeks' vacation after 3 years. The employer group has offered 10¢ an hr.

Molders, in addition to the request for 10¢ an hr increase, want 6 paid days off, a seniority clause and retroactive pay increases back to Apr. 1. The 10¢ an hr increase has been offered but the fringe issues are still unsettled. Molders now receive $1.50 an hr and laborers $1.09 an hr.

NEGOTIATIONS are still in progress between the Boeing Aircraft Co. and the Aeronautical Mechanics Union. The offer of a 10¢ an hr increase by the company was satisfactory to the union but they are also seeking 8 paid holidays and consolidation of labor grades from ten to six. Another meeting of union members is scheduled for May 25 when a discussion will be held on progress to that date and, according to union leaders, a strike date will be set at that time if no agreement has been reached.

The effects of the local strikes have been far reaching since this area determines the pattern for the Pacific Northwest. Last week in Portland practically 1200 members of the Molders & Foundry Workers, Local 139, AFL, were momentarily expected to strike.

Photos Courtesy
Barber-Colman Company
Rockford, Illinois
The Etna Machine Co.
Toledo, Ohio

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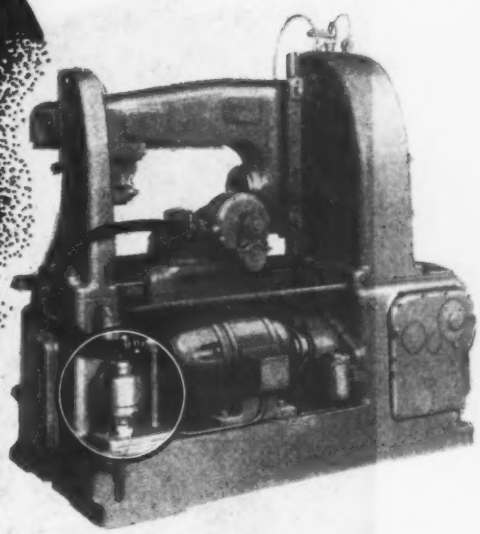

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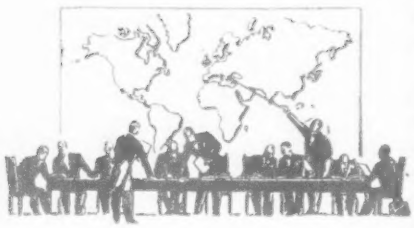
European Letter

JACK R. HIGHT

• Stewarts & Lloyds planning to greatly expand tube mill facilities . . . Ingot capacity to reach 1.4 million tons a year.



CORBY, ENGLAND—The possibilities of greatly expanding tube production has the local mill of Stewarts & Lloyds in a near frenzy of building activity. The British Iron & Steel Federation plan for modernization of the British industry (see THE IRON AGE, May 23, 1946, p. 114) called for an overall increase in the firm's tube capacity of about 25 pct, but that program was based on needs as estimated in late 1944. New plans recently announced disclose that the export demand for tubes is much greater than the company anticipated and the expansion program is now being enlarged. An eventual plan for a mill of 1,400,000 tons annual ingot capacity now seems likely.

The Corby mill was built on the site of the Northamptonshire ironstone fields in 1934 where previously a small iron works had existed. Today, with an ingot capacity of about 672,000 tons it is one of the large major production units in the United Kingdom. The entire ingot capacity is geared to the production of seamless and continuous welded tubes in the company's plants at Corby and elsewhere.

The plan drawn up in 1944 called for an increase in the existing coke oven capacity, at a cost that was estimated at that time at $680,000. This expansion is now under way and is designed to make the establishment self-sufficient from the standpoint of coke supplies. When the Corby works was put down, there was no difficulty in buying from outside sources any quantity of high quality coke. For this reason it was the custom in the United Kingdom to build only so many coke ovens as were required to supply the works with gas.

Increased coal costs, reduced coal output, interrupted supplies due to transport difficulties, and the nationalization of British mines taking the allocation of fuel out of the hands of the steel companies have combined to produce a situation where it seems advisable to balance coke production with consumption in the works. The new coke ovens at present under construction, added to the 113 already in existence, will accomplish this purpose.

Also in the development program drawn up by Stewarts & Lloyds before the end of the war about $4 million was staked out for a new ore handling installation, the rebuilding of blast furnaces, and various additions to increase the output of basic bessemer steel from 560,000 tons per year to about 688,800 tons. This work is also under way at the present time, and despite a number of somewhat discouraging delays the ore plant is expected to be in operation by the end of this year. Two new openhearth furnaces are also to be added to the Corby mill, both of 100 tons capacity. These furnaces with auxiliary installations were originally estimated to cost about $480,000.

COMPLETE details of the revised modernization plan are not available at present, as the plan has not been approved by the Iron & Steel Board. In place of the earlier program, which anticipated a 25 pct expansion of the firm's tube capacity, the new program roughly provides for a 100 pct expansion. The major sections of this extension will be made here at the Corby works.

To cover the requirements of expanded tube mills, the steelmaking capacity of the works will be expanded, but it has been indicated that the expansion of steelmaking will be far beyond the limits of the need for tubemaking. This tonnage of semifinished basic bessemer steel will presumably be used for the important rerolling firms located in the Midlands area.

Some confusion has been caused by the announcement of the plan for a major expansion of the Corby steelmaking capacity—with the latest plan it seems likely now that the total steelmaking capacity will go up to nearly a million tons per year. When the British Iron & Steel Federation plan was drawn up 2 years ago, it called for the construction of a new works on a new site in the East Midlands. This was what the earlier plan had to say on the subject:

"The Midland area calls for an increased production of some 560,000 tons of billets per year within the expanded production program, and also is the area in which the largest quantity of billets is required for rerolling outside the works of the primary producers.

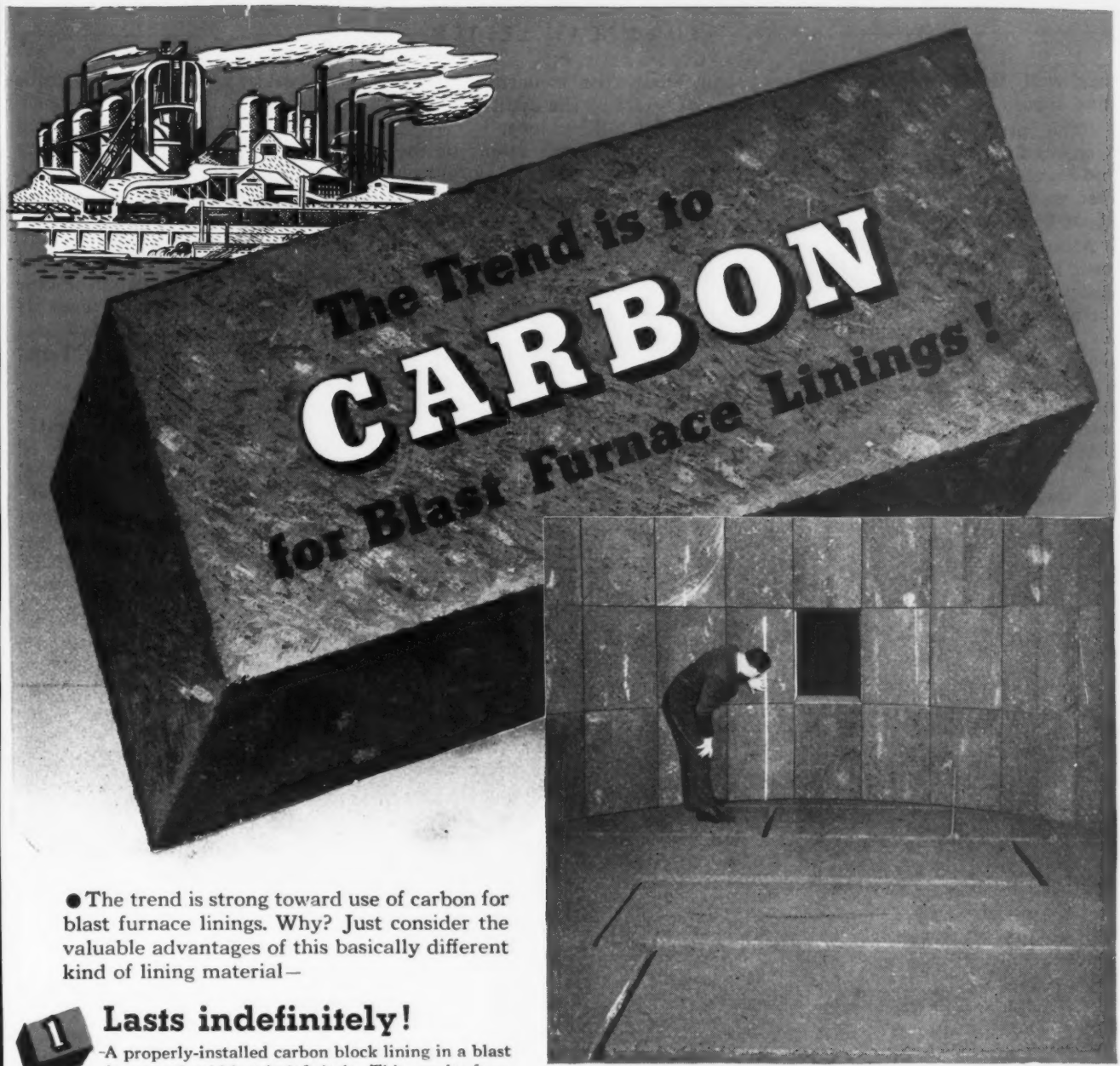
"The proposals provide for this increased demand to be met in the main by the installation of a new plant on a greenfield site and based on home ores. This new enterprise should be based on the Northamptonshire ore reserves.

"The plant will provide for preparation of the ore, coke ovens, blast furnaces, steel plant, cogging mill and a continuous billet mill with a capacity of half a million tons of billets.

"FINISHING mills will also be laid down to roll about two-fifths of the billets into finished products. This will provide the basis of a plant integrated from ore to billet and rerolled product.

"The balance of billets would initially be supplied to the independent Midland rerollers. The longer term policy will involve a review of the desirability of further concentration of rerolling production, including development on the site of the new plant.

"Even at the outset, many questions of a social and economic character, including housing, will need special consideration, and



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2 No Salamander!

Years of experience with carbon linings bears this out. Consider what a saving this feature, alone, can mean to you.

3 Fast, easy to install!

One carbon block can take the place of from 50 to 1000 nine-inch firebrick, depending upon the size of the block. Overall installation time is thus greatly reduced.

Interior of hearth lining looking toward iron notch. Blocks may be of any size desired up to 24x30x180 in.

4 Economical in long run!

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may well determine the date the plan should proceed.

"The proposed plant will be sponsored by the United Steel Cos. and Stewarts & Lloyds." (The total cost was estimated in 1944 to be about $64 million.)

Although no official announcement has been made of the fact, it is considered in some quarters that the proposal to extend Corby is in fact an alternative to the above proposal. There was no suggestion of the fact in the above statement, but the apologists, always in fear of admitting that they have changed their minds, now state that a major expansion at Corby was always an alternative to building on an entirely new site.

One of the most interesting factors in the decision on the big expansion of the works here is the change in general timing. When the original plan was set forth, although definite priorities were not established for each modernization plan, it was generally understood that the proposal for an entirely new works on the Northamptonshire ironstone fields was to be one of the less urgent items.

DUE to the very serious immediate and short-term scrap supply problem, as well as in the long term, the prospect of new basic bessemer production on domestic ore has become one of the priority items. The final plan is being considered by the government Iron & Steel Board at this writing, and the decision of the Board is expected in the very near future.

No British sources have hazarded a guess as to the fate of the original proposal that the United Steel Cos. would participate in the program. The developments now brought forward to expand Corby will be pursued by Stewarts & Lloyds alone. According to the best information available from official sources, the proposal for a joint enterprise on another Midlands site still stands for consideration at some indefinite future date.

Inasmuch as the chairman of the Steel Board recently stated that that body subscribed to the overall national ingot capacity as specified in the white paper, it appears definite that the Board at least has no intention of authorizing the expansion of the modernization of the program by the addition of another half million tons.

It is only these sections of the earlier modernization program that can be seen as one goes through the works here. There is a new continuous weld tube mill going up that will produce a product up to 4 in. nominal bore, in comparison with a maximum of 3 in. nominal bore today.

In addition to the expansion of steel production facilities, the provision of housing is one of the major problems in the development of the Corby community. When, in the thirties, the firm transformed this village from one of a few hundreds to a town of several thousands, the steel company sponsored the necessary housing development. The houses were built to rent to the workmen and to be amortized over a 30-years period, renting at from $1.60 to $2.00 per week.

NOW, with a Socialist Government in power, the local municipal government has taken over the housing problem, is currently engaged in the construction of 1500 new housing units, some of the traditional British brick construction, others of those standard prefabricated types which I have already described. Of special interest to the steel community are those "steel houses" sponsored by the steel industry itself. Corby has been allocated 500 of this type. Entering one nearly completed, under miserable weather conditions, I found it a highly desirable type.

As part of their postwar development in Scotland, Stewarts & Lloyds are undertaking some major extensions to their steel production capacity at Clydesdale Works, Mossend, and installing an additional large-diameter seamless tube plant at the same site.

The new steel furnaces should be ready for operation within the next few months, but the tube mill will not be completed until the end of 1947. It is estimated that these new plans will give employment to a total of some 1100 men. Approximately 600 will be in the steel department, plus 500 in the tube mill.

The new steelmaking unit is replacing existing furnaces now out of date, and is for the express purpose of producing high quality steel castings suitable for tube manufacture. Four basic open-hearth furnaces are being installed along with the necessary auxiliary equipment. The furnaces will each be of 60 tons capacity, producer gas fired, and will be fully instrumented. Gas ports will be water cooled. The furnaces will be charged with two floor type charging machines, each capable of handling boxes up to five tons in weight. This program will cost approximately $500,000.

The firm is also installing a complete new tube mill of the lighter type. This mill will be capable of handling up to 1500 tons of steel per week, making seamless hot finished tubes up to 16 in. in diam. Approximately half of the Clydesdale steel output will be absorbed by the Clydesdale tube mill, while the balance will be sent to other of the firm's tube works.

Wean Gets French Orders

Cleveland

• • • **Wean Engineering Co.,** Warren, Ohio, has received orders from five leading French companies for rolling mill equipment, according to R. J. Wean, president.

Mr. Wean said the orders have been received through Wean Engineering's French representatives, Documentation et Licenses, Paris, and are some of the first orders placed by the French private steel industry since the liberation of the country.

Under the Monnet Plan for the reconstruction and expansion of French industry, the steel industry hopes gradually to reach a total production of 15 million tons a year compared with its record production of 9,800,000 tons in 1929.

Some of France's steel-producing equipment, as in the case of "heavy strip mills," far exceeds the nation's needs, according to Eugene Roy, director of the Longwy Steel Works and chairman of the Iron & Steel Commission that drew up the steel program.

Mr. Roy has pointed out that the best of the equipment will be used and the balance kept in reserve. Total cost of modernizing the French iron and steel industry has been estimated at 70 billion francs.

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It pays to be "fussy" about the spring steel you use. It's smart to insist on consistent results and precision characteristics. It's logical to specify CMP spring steel. For CMP pioneered precision strip processing techniques and have remained the pacesetters in precision methods. In their spring steel CMP offers you these 5 important advantages:

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PERSONALS

o o o

• **George M. Schurman,** president and treasurer of the National Bag Corp. since 1930, has been elected a director of American Brake Shoe Co., New York.

• **Robert E. Burns** has been appointed manager of sales, St. Louis district, Bethlehem Steel Co. Mr. Burns, who has been a member of the St. Louis sales organization since 1940, succeeds Charles H. Cecil.

• **E. N. McKelvey,** formerly superintendent of the Lakeside Div. of the Otis Works, Cleveland, Jones & Laughlin Steel Corp., has been appointed assistant to the general superintendent of the Otis Works, succeeding **F. W. Mumper,** who has been transferred to the general offices of Jones & Laughlin at Pittsburgh as director of personnel and industrial relations.

• **C. T. Goodwill** has been appointed manager of the sales strip division and **D. A. Nabb,** manager of sales tube division of the Detroit Tube & Steel Co., Detroit. Mr. Goodwill was formerly in charge of sales for Bopp Steel Corp., and Mr. Nabb was in charge of sales at Detroit Seamless Steel Tubes Co. The new appointments were brought about through the consolidation of the two companies into Detroit Tube & Steel Co.

• **Loring Phillips** has been appointed market research analyst, Blaw-Knox Co., Pittsburgh. During the period from 1944 until accepting the Blaw-Knox position, he was a senior associate of Stewart, Dougall & Associates of New York.

• **James C. Travilla, Jr.,** who for many years has been chief mechanical engineer of the General Steel Castings Corp., Eddystone, Pa., has been elected vice-president, engineering. **James Macdonald,** who for many years was assistant to vice-president, sales, and for the past few years was assistant to the president, has been elected vice-president.

ANTHONY M. KOHLER (left) and ALAN E. PHIN (right), vice-presidents, Babcock & Wilcox Co.

• **Anthony M. Kohler** and **Alan E. Phin** have been elected vice-presidents of the Babcock & Wilcox Co., New York. Mr. Kohler joined the company in 1913 and was general manager of the refractories division at the time of his new appointment. Mr. Phin joined the company in 1927 and has been in charge of accounting since that time.

• **Eugene L. Mench** has been appointed to take charge of truck engineering for Nash Motors Div., Kenosha, Wis. He formerly was transportation engineer for International Harvester Co. and later an automotive engineer with the Army Ordnance Dept.

• **Edward S. Budd** has been elevated to the post of manager of parts division of the Cooper-Bessemer Corp., Mt. Vernon, Ohio. Mr. Budd also carries the title of assistant secretary of the corporation. **J. F. Stevenson** has been appointed assistant works manager of the Grove City, Pa., plant of the Cooper-Bessemer Corp., to succeed the late **M. A. Winland,** who died recently. Mr. Stevenson was formerly production manager of the company's Grove City plant. Other recent Grove City promotions include **W. A. Luli,** who was named production manager; **R. H. Bragg,** assistant production manager; **H. K. Stevenson,** general superintendent, and **W. W. Richards** as chief planner. All of the appointees have been connected with the production and planning department.

• **Sylvester S. Robinson** is retiring on June 1 as foreman of the finishing department of the American Bridge Co. plant in Elmira, N. Y.

• **Herman J. Spoerer,** supervisor of industrial relations in the Chicago district for Youngstown Sheet & Tube Co., has been appointed director of industrial relations for the entire company. Mr. Spoerer is being transferred from the Indiana Harbor, Ind., plant to the company's general offices in Youngstown, Ohio.

• **Clarence E. Hawke** has been appointed director of domestic sales of the Carborundum Co., Niagara Falls, N. Y. **Edwin B. Forse** has been appointed manager of the Carborundum refractories division at Perth Amboy, N. J.; **Boyd H. Johnson,** manager refractories sales at Perth Amboy, and **Russell G. Albertson,** division manager, Canadian Carborundum Co., Ltd., Niagara Falls, Ont. Mr. Hawke has been sales manager of the refractories division at Perth Amboy since 1920. Mr. Forse was works manager of the refractories division. Mr. Johnson, who succeeds Mr. Hawke as manager of refractories sales at the Perth Amboy plant of the refractories division, joined the Carborundum organization in 1920, and in 1921 joined the refractories division staff at Perth Amboy as head of the engineering department. Mr. Albertson had been works manager of Canadian Carborundum Co., Ltd., since 1946.

• **Lloyd U. Dunham** has been appointed assistant superintendent of the blast furnace department, Colorado Fuel & Iron Corp., Pueblo, Col. Mr. Dunham has been blast furnace practice man since 1944.

• **Dr. Claude C. Peavy** has been named chief engineer of Houdry Process Corp., Philadelphia. Dr. Peavy joined the corporation a little over a year ago as chief of the process design division. **Harmon J. Monnik** has been made chief of the mechanical engineering department of Houdry, and **William C. Dickerman** will be in charge of process design.

• **E. D. Cowlin** has been appointed general manager of the Reliance Div. of Eaton Mfg. Co., Massillon, Ohio. He has been with Eaton since 1924.

• **Frank D. Hazen,** who has been general sales manager of the industrial department of American Arch Co., Inc., New York, has been appointed vice-president and general manager of the department, with headquarters at Pittsburgh. He has been associated with American Arch for 22 years.

• **M. P. McCullough** has been elected vice-president of the D. J. Murray Mfg. Co., Wausau, Wis. **C. E. Staky** has been elected executive vice-president and general manager; **A. W. Plier,** secretary and assistant general manager, and **J. S. Alexander,** treasurer.

• **George W. Troost** has been made comptroller of Chrysler Corp., Detroit. Mr. Troost has been associated with Chrysler as assistant comptroller for the past 12 years. **Oliver H. Clark,** executive engineer of Chrysler Corp., has retired after more than 38 years of active service in the automotive industry. Mr. Clark became associated with the engineering division in 1925, and was appointed executive engineer in 1935.

• **J. Elmer McKinney,** formerly associated with the Aluminum Co. of America, Detroit works, has joined the engineering staff of Kellogg Co., Battle Creek, Mich.

ANDREW FLETCHER, president, St. Joseph Lead Co.

• **Clinton H. Crane,** who had been president of the St. Joseph Lead Co., New York, for the past 34 years, has been elected chairman. **Andrew Fletcher,** who had been vice-president and treasurer of the company since 1929 and executive vice-president since May 1946, has been elected president.

• **J. D. Ramsay** has been elected chairman of the board; **E. M. Weinfurtner,** president; **H. E. Stuhler,** first vice-president and treasurer; **H. H. Hopwood,** vice-president in charge of sales, and **E. W. Valensi,** secretary and comptroller of North American Refractories Co., Cleveland. These men have also been elected directors of the company and members of the executive committee. Also elected directors are: **W. G. Bauer, F. H. Deal, E. F. Hayes, J. E. Hindman, J. H. McNerney, K. G. Seaton,** and **W. N. Sleicher.**

• **Gordon Monfort** has been appointed advertising manager of Cutter Laboratories, Berkeley, Calif. He formerly served as head of Caterpillar's Peoria news bureau prior to joining Cutter.

• **James Coulter** has resigned as president and treasurer of the James Coulter Machine Co., Bridgeport, Conn. The officers as elected are as follows: **Henry G. Emt,** president and treasurer; **Edwin W. Thornton,** vice-president, and **Royal K. Thornton,** re-elected secretary.

• **William T. Gossett,** vice-president and general counsel of the Ford Motor Co., Dearborn, Mich., has been elected to the board of directors, succeeding Herman L. Moekle, former vice-president, who has resigned.

• **Fred Meyer** has been appointed to the executive staff, Nelson Stud Welding Corp., Lorain, Ohio, as chief engineer, railroad industry division.

• **Richard M. Lawrence** has been appointed to the staff of the development department of the Monsanto Chemical Co., St. Louis. He will specialize in market research work. Mr. Lawrence was formerly associated with the development department of Atlas Powder Co. and the chemical division of U. S. Tariff Commission prior to his appointment at Monsanto. **F. A. Abbiati** has been appointed assistant general manager of the Monsanto Chemical Co.'s plastics division, with headquarters in Springfield, Mass. Mr. Abbiati, formerly general manager of sales, will be succeeded in that position by **James R. Turnbull,** who until now has been assistant general manager of sales. Other changes in Monsanto personnel are: **Robert K. Mueller,** plant manager, East plant, is now assistant production manager; **Kenneth M. Irey,** plant manager, West plant, appointed plant manager of both East and West plants, and **W. T. Dickens** now becomes assistant plant manager of both plants. **Josiah B. Rutter** has been appointed general manager of the Merrimac Div. of Monsanto with headquarters at Everett, Mass. Mr. Rutter's former position, director of the general engineering department, will be taken over by **Fred G. Gronemeyer,** who is at present assistant director of the general engineering department. Mr. Rutter joined Monsanto as superintendent of construction of Merrimac Chemical Co. in 1919. In 1936 he was transferred to St. Louis as chief engineer of the company. In 1939 he was made director of the general engineering department. Mr. Rutter succeeds **Daniel S. Dinsmoor,** who has resigned as vice-president of Monsanto Chemical Co. and general manager of the Merrimac Div.

• **Grenville R. Holden,** formerly assistant to the president, has been elected vice-president of Sylvania Electric Products, Inc., Ipswich, Mass.

• **Gilbert A. Bunn,** representative for Kennametal Inc. in the eastern Michigan area, has been appointed manager of the Middle-Atlantic district with offices in Philadelphia. Mr. Bunn is being succeeded by **R. H. Oberholtzer** of the Detroit staff. Mr. Oberholtzer had been with Pontiac Motor Div. as a tool engineer during the war and more recently held a similar position with Clark Equipment Co. before joining Kennametal's staff last year.

• **George L. Smutny** has been appointed food industries representative of the general machinery division at Allis-Chalmers Mfg. Co., Milwaukee, to succeed **Andrew M. Marsh,** who is resigning but will continue to serve in an advisory capacity.

• **William J. Peltz** has been appointed to the executive staff of Philco Corp., Philadelphia, to carry out special assignments in various divisions of the corporation. Mr. Peltz joined Philco in 1925. For the past 18 months he has been production manager of the refrigerator division.

• **Ivan F. Baker** has been elected vice-president of the Westinghouse Electric International Co., New York. Mr. Baker has been treasurer of the company since 1945, a post he retains along with that of director of the company.

• **William B. Anderson** has been appointed manager of the aviation gas turbine division of the Westinghouse Electric Corp., Pittsburgh. He succeeds **George H. Woodard** as division manager. Mr. Anderson joined the division a year ago as manager of design engineering, and last February was made assistant manager of engineering.

• **Kenneth R. Corson** will head up the industrial products division of Clark-Babbitt Industries, Inc., Boston. Mr. Corson formerly represented the Continental Screw Co. and Hy-Pro Tool Co. in the New York Metropolitan area.

WILLIAM GILLETT, vice-president, Detroit Steel Products Co.

• **William Gillett** has been elected vice-president of Detroit Steel Products Co., Detroit, and **H. D. Palmer** has been elected vice-president and director of labor relations. Mr. Gillett, who joined the company in 1930, was made manager of the steel deck division in 1935, and in 1945 was made head of the newly-created building panels division. Mr. Palmer came to the company in 1922 from Detroit City Gas Co., and has successively been credit manager, assistant treasurer, and director of labor relations.

• **Verdie A. Dodds** has been made president of Brown-Wales Co., Boston. He succeeds **Quincy W. Wales,** who becomes chairman of the board.

• **George W. Hopkins, Jr.** has been appointed Great Lakes district representative for General Electric Co.'s wiring devices, Cleveland. He came with the company in 1945 as an order service clerk in the accessory equipment and wiring device divisions in Bridgeport, Conn. Last year he became a sales clerk in wiring device sales.

• **Homer Parsons** has been appointed director of exports for the American Brake Shoe Co., New York. Mr. Parsons has been with Brake Shoe since 1945, and has been serving as assistant director of exports for the past 6 months.

• **Herbert C. Guterman,** who has been senior vice-president and general manager of the Arma Corp., Brooklyn, since 1946, has been elevated to president. Mr. Guterman, in his new capacity, succeeds **Arthur P. Davis,** one of the corporation's founders, who remains as a director and engineering consultant.

• **Leroy F. Marek** has been elected vice-president of Arthur D. Little, Inc., Cambridge, Mass. Mr. Marek has been with Arthur D. Little, Inc., since 1934 and has for several years been in charge of its chemical engineering activities.

• **Brig. Gen. Hugh C. Minton** will become production manager of Koppers Co., Inc., Pittsburgh, on July 1.

• **Henry F. Griswold,** former general works manager of the J. I. Case Co., Racine, Wis., has been appointed works manager for the Jacobsen Mfg. Co., Racine.

• **William L. Melcher,** product service supervisor at A. O. Smith Corp., Milwaukee, has been transferred to New Orleans, where he will have charge of water heater and conversion burner sales for that territory.

• **W. J. Campbell,** General Electric Co. welding engineer, will take on duties July 1 as GE arc-welding specialist for the southeastern district, with headquarters in Atlanta. In his new position Mr. Campbell will cover the states of North Carolina, South Carolina, Tennessee, Georgia, Florida, Alabama, Mississippi, and part of Louisiana. Mr. Campbell joined the General Electric Co. in 1941.

• **George W. Shannon** has retired as general traffic manager of the Otis Elevator Co., New York, after 41 years with the firm. He has been succeeded by **Charles E. Coyle,** assistant general traffic manager.

• **Robert H. Ehret** has been appointed assistant sales manager of the Electric Products Co., Cleveland. Mr. Ehret will be responsible for handling headquarters sales negotiations. He joined the Electric Products Co. in 1945.

(CONTINUED ON PAGE 120)

Famous Westco Tur-
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with renewab
for high-hea
speed ser
Can ANYONE sell a pump?
No, just anyone can't sell a pump —properly.
It takes a lot of adroit engineering to figure the right pump for any specific job. It takes a broad background of experience to enable a man to be sure he's selling you a pump that will make you a long-term friend and customer.
This engineering ability and experience are yours when you buy from a Fairbanks-Morse-Pomona dealer.
He knows pumps. He has the broadest line to choose from; he's backed by all the engineering and production resources of Fairbanks-Morse. He can offer you skilled, impartial advice—he can sell you the pumping savings and satisfaction you're after.
FAIRBANKS-MORSE
A name worth remembering
DIESEL LOCOMOTIVES

Dear Editor:

MAGNETITE

Sir:

We are currently producing a high grade magnetic iron concentrate. The ore is mined from a natural deposit, which, to the best of our knowledge, contains the highest grade magnetite in a natural state ever found in quantity before. We are given to understand that most of the material used in the U. S. for the manufacture of powdered iron at the present time is imported from Sweden or manufactured locally from mill scale. We are anxious to increase our production at this time and will greatly appreciate any information that you are able to supply as to whether there is a powdered metal association in the U. S. and where it is; names of users of powdered iron in the manufacture of radio cores; also names of manufacturers of powdered iron.

W. L. EDWARDS
Vice President
Tomahawk Iron Mines Ltd.
Toronto

● The Metal Powder Assn. is located at 420 Lexington Ave., New York 17. A list of users of powdered iron for electrical purposes is being forwarded together with names of manufacturers of powdered iron. We understand that manufacture of electrical parts from iron powder is limited at the present time to grades such as carbonyl iron and electrolytic iron.—Ed.

STEEL STACKS

Sir:

We seek a manufacturer of steel tubing who makes a sectional 12-in. stack in heights of 35 to 45 ft. We would appreciate it if you could put us in touch with several such manufacturers.

D. W. HOWE
Business Manager
The Burlington Free Press
Burlington, Vt.

● Names of manufacturers of steel stacks who may be able to meet your requirements, are being mailed to you.—Ed.

ELECTROPOLISHING SILVER

Sir:

My copy has been misplaced and I would appreciate you sending me tear sheets of the article, "A New Process for Electropolishing Silver" in the Apr. 10 issue.

W. G. ROEPKE
Chief Chemist
General Steel Casting Corp.
Granite City, Ill.

SCREW SORTING MACHINE

Sir:

We have an inquiry from one of our customers for a screw sorting machine. If you have knowledge of such a machine we would appreciate your furnishing us with the name of the manufacturer.

W. G. JOHNSTON
Equitable Equipment Co.
New Orleans

● There are no screw sorting machines on the market at the present. However, it should be possible to have one built to specifications by any of the larger special machine designers and manufacturers.—Ed.

REQUEST FROM CHINA

Sir:

We are interested in obtaining some literature on the latest developments in the galvanizing wire industries. Our galvanizing methods here cannot be called modern. Drastic improvements are necessary on the line of hot spelter and electro galvanizing of drawn wire from 6 to 30 gage.

CENTRAL STEEL CO. OF CHINA
Shanghai

CONTACT ARCWELDING

● The statement in the article "Contact Arcwelding" (Dec. 12, 1946), that the process can be performed by entirely unskilled workers appears to have aroused some criticism among the welding fraternity. Perhaps the statement should have been qualified by the remark that, although the author states that the work "is no more difficult than melting a candle at a uniform rate against a hot plate," a considerable knowledge of the art of welding is still necessary for the choice of electrodes, setting the controls, preparation of the work, avoidance of distortion and all the other details essential to the making of a good weld.—Ed.

OXYGEN IN THE OPENHEARTH

Sir:

In the Feb. 20 issue you had an article, "Use of Oxygen in the Openhearth Bath," that is of intense interest to our metallurgist and our original copy of this magazine has had the article taken out. Whichever is the more convenient will you please send two of the magazines or two sets of tear sheets.

WALTER N. WHITNEY
Pratt & Letchworth Co.
Buffalo

● Tear sheets have been mailed.—Ed.

RESISTANCE WELDERS

Sir:

Some weeks ago I read in the Mar. 20 issue the article "Automatic Resistance Welders Speed Railroad Car Construction" by Arthur M. Unger, Chief Welding Engineer of Pullman Standard Car Mfg. Co. It was a brilliant article containing interesting facts. As a foreign student from the Netherlands, studying at Carnegie Institute of Technology . . . and knowing that such technical articles and topics would be much appreciated in Holland, I would like your permission to translate that article for publication in the monthly magazine of the Dutch Society for Welding Engineering, in my native country.

R. P. STEYN
Carnegie Institute of Technology
Pittsburgh

● Both Pullman Standard and THE IRON AGE are happy to accord you permission to translate and republish the article.—Ed.

AGING 61S SHEET

Sir:

If available, will you please send me two tear sheets of the article, "Heat Treatment and Aging 61S Sheet" by J. A. Nock, Jr., appearing on p. 48 of the Apr. 24 issue.

G. E. OTTER
Chief Engineer
Fleet Mfg. & Aircraft Ltd.
Fort Erie, Ont.

LAMINATION DIES

Sir:

We are at present contemplating having constructed for us a progressive rotor and stator lamination die. Rotor to be 3⅝ in. in diam, stator to be 6¼ in. in diam. We have been advised that you may be able to give us the names of the die manufacturing concerns that specialize in this type of die work.

R. F. PEZZILLO
Pezzillo Pump Co.
Philadelphia

● We are forwarding a list of the larger lamination die manufacturers who we believe will be able to supply you.—Ed.

DIRECTORY OF TOOL STEELS

Sir:

We would like to have several of the booklets, Directory of Tool Steels, or a revised edition if possible, as they can be used to a great advantage throughout our plant. We have had several of these booklets but they are shop-worn; they have been patched and repatched.

R. PROCTOR
Foreman, Order Dept.
Lindberg Steel Treating Co.
Chicago

● The 19th revised edition is now being published. It will be available to subscribers in the near future at the following prices: One or two copies, $2.00 each; three copies, $4.50; six or more copies, $1.00 each.—Ed.

SELECTING CAST IRON

Sir:

Will you please send me tear sheets on "A Practical Method of Selecting the Correct Type of Cast Iron" by K. R. Geist and W. A. Hambley, Allis Chalmers Mfg. Co., as published in Oct. 17 and 24 issues.

WILLIAM R. ARNTSON
Metallographer
Continental Motors Corp.
Muskegon, Mich.

They mean the same in steel

N-A-X HIGH-TENSILE is synonymous with SAE 950 at its best. It is recommended by a long record of successful applications which involve severe forming operations, severe service conditions. When specifications call for SAE 950, get the full benefits of N-A-X HIGH-TENSILE'S *proved* properties: 1) High strength. 2) Finer grain structure. 3) Good formability. 4) Excellent weldability. 5) High fatigue-resistance. 6) Great impact toughness. 7) High corrosion-resistance. N-A-X HIGH-TENSILE has all seven—keeps all seven.

MAKE A TON OF SHEET STEEL GO FARTHER
Specify—
N-A-X
HIGH-TENSILE STEEL

GREAT LAKES STEEL
Corporation

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UNIT OF NATIONAL STEEL CORPORATION

Industrial News Summary...

- **Construction Picture Not So Dark**
- **Steel Output Reaching New Levels**
- **Chance of No Coal Strike Is Good**

REPORTS on construction cancellations and postponements are not as dark as they look. A quick survey of leading engineers and fabricators shows that postponements are running into large figures but actual cancellations are not serious. Where figures were given it was said that postponements run "into the millions."

A breakdown of some of the postponed cases reflects a watchful waiting attitude on the question of prices. Equally as important, and probably more optimistic, was delayed action due to inability to obtain specific delivery dates. Outright cancellations among those interviewed were too small to indicate a definite trend in this direction. One large company was of the opinion that if uncertainties over delivery dates and the probability of further wage increases were eliminated, current prices would be no factor in holding up large construction projects.

As far as steel mills were concerned, orders on the books for structural shapes and plates were heavy, deliveries far behind, and there was every indication that because of the freight car building program these products would be in tight supply for some months to come. Leading steel officials in steel construction departments say that many contractors would place substantial orders for structural products as soon as firm delivery dates could be assured. This indicates that the substantial backlogs on mill books is no true indication of the limit of construction activity to take place in the future.

SOME large fabricators state that private construction jobs are going ahead unhindered by postponement or cancellations. Some state and municipal jobs are being postponed mainly because of the higher cost of completion compared with the original estimates. More significant are the actions of practically all large steel companies contemplating building and machinery additions. Recognizing that the price level, just as the wage level, is on a higher economic plane, these companies have decided to go ahead with construction in order to remain in a good competitive position. It seems likely that this procedure is being adopted by other industries.

While it is too early to determine the actual demands which John L. Lewis will make upon the northern coal operators, representing more than 75 pct of the nation's output, feeling throughout the industry is more optimistic this week than at any time in years. Both the union and the operators want to see the coal industry back in private hands as quickly as possible. Measuring the temper of both sides, there is a good possibility that the United Mine Workers will reach a satisfactory wage agreement with the northern operators before July 1, thus preventing a serious coal tieup which would have disastrous effects upon steel and other industries.

Major emphasis in the steel industry this week is on production. Some areas are even exceeding wartime output, although the national rate is still about one point below previous postwar peaks. Nevertheless, the next few weeks will probably average as high an operating rate as has been seen since wartime days. This week the rate is up 1½ points to 96.5 pct of rated capacity from last week's revised rate of 95 pct.

Ringleader in the steel industry's race for new production levels is the Pittsburgh district where the operating rate this week will average 105 pct of rated capacity. It is estimated that this major steel center will turn out about 400,000 tons of steel ingots this week. Other districts topping the 100 pct rate are: Buffalo at 102 pct; Detroit, 102.5 pct; and the West Coast at 110.5 pct. Indications are that the rate next week may break all time peacetime peaks.

STEEL order volume last week continued to roll into mills at a level exceeding actual shipments at most areas. There was no sign of softness in any steel product and some of the products which had been slightly easier had tightened up. With a bumper wheat crop in the West, steel deliveries in the future might be slowed down temporarily as urgently needed freight cars are rushed from the East to the western wheat fields. With shippers becoming used to freight car shortages this new development is not apt to produce too serious a situation.

Indiscriminate sales of obsolete or unusable inventories by some steel consumers caused a few eyebrows in the steel industry to be raised in temporary anger this week. Some steel consuming companies are now in the process of preparing lists of such steel items and plan to pass them around in an effort to dispose of obsolete sizes and so forth.

One of the reasons for the sour note in the steel industry over the sale of inventories by large users is the fact that many of the latter are continually vocal over what they say is a steel shortage. Some sources say that the unloading of such surplus inventory at high prices fosters and continues the gray markets which the steel industry and the vast majority of steel users had hoped would be eliminated by this time.

THE scrap market this week was vulnerable. At most centers old orders had been cleaned up and renewed efforts were being made by brokers to pick up substantial tonnages of material at current prices. In the large consuming areas it is expected that the next few weeks will present a severe test of current market quotations. Any easiness will spell a further decline while inability to obtain sufficient material might bring about a slight upward movement in prices.

THE IRON AGE steel scrap composite edged off this week to $29.50 a ton, a decline of 8¢ from last week's figure of $29.58. The new level represents a low for the year so far.

• **LOST AGAIN**—Workers in the main plant, Thompson Products Inc., rejected the United Automobile Workers (CIO) as a bargaining agent by a 993 to 419 vote, according to results announced by M. S. Rider, regional National Labor Relations Board director. Last week's election marked the eighth effort of "outside unions" to win collective bargaining rights.

• **FIRM PRICES—QUICK DELIVERY**—The big three of the concrete bar producers are out soliciting orders for fabricated business. Firm prices are also being quoted on such orders. Delivery on mill lengths, however, is still bad with the mills sold out for the year and price at time of shipment still in effect.

• **CAR AND TRUCK REGISTRATIONS**—New car and truck registrations during the first quarter of 1947 may reach 800,000 units, according to R. L. Polk & Co., Detroit. Based on returns from 39 states reporting 563,139 cars registered, Polk predicted that approximately 600,000 new passenger cars will be registered during the first quarter. New truck registrations for 39 states comprising 73.7 pct of the normal U. S. total indicate that the previous all time truck registration record established in October 1946 may be broken during March. Polk predicted that the quarter will end with approximately 200,000 new trucks registered and that the March total will exceed 74,700 units.

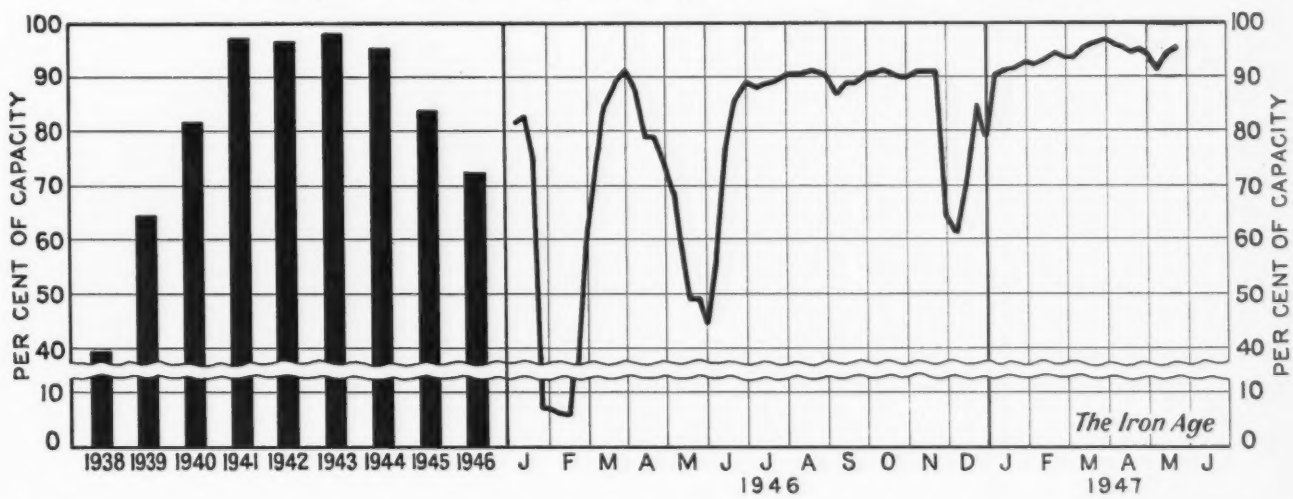
• **CANADIAN WIRE OUTPUT**—Canadian production of nails in March was at the highest monthly rate in almost a year, totaling 6524 tons, as compared with 6015 tons in February and 5614 tons in March 1946. For the first 3 months of this year nail output totaled 18,857 tons against 17,539 tons in the corresponding quarter of 1946. Output for the month under review included iron and steel cut nails, 85 tons against 98 tons last year; steel wire staples, 216 tons against 162 tons; tacks of steel brass and copper, 208 tons against 222 tons. Steel wire fencing produced in March amounted to 2261 tons compared with 2109 tons in March 1946, while output of steel wire was 27,524 tons against 23,547 in March last year.

• **MORE PIG IRON**—The Lone Star Steel Co., the Sheffield Steel Corp., and Koppers Co., Inc., have made agreements with Housing Expediter Frank R. Creedon to produce large tonnages of foundry and malleable pig iron for housing equipment. The iron will be produced in surplus blast furnaces leased from the government. It supplements leasing arrangements previously made with WAA. The Lone Star Co. with a leased furnace at Daingerfield, Tex., will devote its full output for the housing program through September and at least two-thirds of its output for the remainder of the current year. Its production of foundry and malleable iron, it was stated, is expected to rise from 12,000 gross tons in the first month of operation to 36,000 tons in the fourth quarter. Sheffield, with a leased furnace at Houston, will devote one-third of its total output to malleable and foundry grades through June 30. From July 1 through Dec. 31 Sheffield will produce 4500 tons monthly for housing. Renewing a lease on a blast furnace at Granite City, Ill., Kopper has agreed to ship about 30 pct of its furnace output to producers of housing items from June 1 to Dec. 31.

• **LIGHT RAILS OUT**—Carnegie-Illinois Steel Corp. will discontinue the manufacture of 20-lb rails after the completion of current orders on the books. From now on only four light rail sections will be made by this company. The sections to be continued are 2540, 3040, 4040 and 6040.

• **OUR BOSTON MAN SAYS**—Situations are difficult to understand these days. The scrap trade is on a sitdown strike for higher prices, yet foundries are busy. Metal using plants complain of a steel shortage, yet layoffs from this cause are unimportant. Machine tool builders complain about falling business, yet a majority will take on a good tool operator any day. Demand for cotton goods is extremely slack, yet New England textile machinery manufacturers are busy and will be through 1947. Unemployment among non-metal workers is on the up, yet moving picture houses and base ball parks are crowded. Talk of buyers' resistance is rampant, yet prices do not average more than 10 pct lower. Security values have fallen below book values and earning capacity, yet nobody wants stocks. Everybody seems to have lost confidence in everything, yet for no good reason.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
May 13	103.5*	90.5	92.0	94.5*	97.5	100.0	100.0	99.0	102.5	105.0	133.0	68.5	95.0	95.0*
May 20	105.0	95.0	92.0	94.5	96.0	102.0	100.0	99.0	102.5	110.5	99.0	68.5	97.0	96.5

* Revised.

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FTC Stalemated in Its Attempt to Gain Additional Power

Washington

• • • **Continued efforts** by the Federal Trade Commission to bolster its present power to block "concentration" of "big business" through additional amendment to the Clayton Act appear to be currently stalemated, largely through failure of the FTC to convince a Senate subcommittee that such a change is justified. This seems to be particularly true with respect to steel interests acquiring drum production facilities.

More specifically, the FTC now not only has power to force divestiture of stock but to block acquisitions of business through purchases of stocks; however, it is powerless under existing law to prevent acquisition of businesses through purchases of physical assets such as plants and facilities.

Said to have been written by FTC Commissioner Robert Freer, an amendment to Sec. 7 of the Clayton Act has been proposed in both houses of Congress in similar bills offered by Rep. Estes Kefauver, D., Tenn., and Sen. Joseph C. O'Mahoney, D., Wyo. Under this proposal, the Commission would receive additional broad powers which would enable it to prevent acquisition of assets when, in the "judgment" of the FTC, such sale might lead to "probable" lessening of competition in the particular industry involved.

Unless it is given this power, the Commission contends, its hands are tied in preventing not only concentration of industry but blocking "big business"—should it desire—in buying out a competitor, transferring the assets or closing down the facilities, and thus presumably leaving the stockholder high and dry.

Despite the fervor with which the FTC is pushing for enactment of the amendment, it is conceded that it has little chance to pass this session. A hearing has been held by a House committee which has indefinitely postponed further meetings on the subject. Although the Senate subcommittee has opened hearings, indications are that it will move slowly and go into the matter thoroughly before

Senate Is Unconvinced Change In Clayton Act Is Justified In Concentration Fight

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making any recommendations whatever. The first day of hearing, under Sen. Homer Ferguson, R., Mich., as acting chairman, left the impression that the subcommittee believes the amendment smacks too much of regimentation by placing too much power in the hands of one agency.

Taking the steel drum industry as a pertinent example (THE IRON AGE, Sept. 21, 1944, p. 103), Dr. John Blair, assistant chief economist; Edward Fisher, attorney, and, Walter Wooden, associate general counsel, appeared as representatives of FTC before a Senate Judiciary subcommittee on May 14 to present FTC's case. It was charged that the steel industry had taken over 87 pct of all steel drum production (not including the smaller items such as pails, etc., included in the definition of the Commerce Dept.) through acquisition of physical assets and thus in effect had set up a monopoly in the steel drum business.

Through purchase of such assets since 1939, it was claimed, four steel firms had acquired 70 pct of all drum production while three others had obtained 17 pct. This, it was charged, not only left

The Whipping Boy

the consumer at the mercy of "big business" but, it was added, steel firms had in some instances squeezed out independent wholesalers by turning distribution of their drums over to their own distributors.

In support of his contention that acquisition by the steel companies reduced competition, a statement by Dr. Blair that "competition between larger firms is not as intense as that offered by small concerns" brought instant rebuttal from R. E. McMath, vice-president of Bethlehem Steel Co., to the effect that his firm would much rather compete with the small producer than one with resources comparable to its own.

Also representing the steel industry were Roger Blough, general solicitor, U. S. Steel Corp.; Max D. Howell, vice-president, U. S. Steel Corp.; F. T. Barton, president, Jones & Laughlin Steel Barrel Co.; J. T. Ross, Jones & Laughlin attorney, and Herbert S. Boring, assistant secretary, Portsmouth Steel Co.

In response to a statement by FTC representatives that the steel firms sought to buy up the drum production, Mr. Howell declared that in no instance had the U. S. Steel Corp. "sought" to buy such firms—that each time his firm had been approached by those who wanted to sell and that in each instance negotiations covered a length of time and were agreed to only after investigation.

Upon questioning by Senator Ferguson, it was admitted by FTC that it had made no study as to the effect of the transfers upon prices which, steel men asserted, certainly had not risen.

Charges that the steel companies inserted restrictive clauses in purchase contracts, thereby preventing the sellers from entering the steel drum industry again, were denied by company representatives. Jones & Laughlin representatives said that this had been done only in one instance but the seller had been released from the restriction less than a year later and that he was now back in the business.

FTC also admitted that it could find no evidence of collusion, either in the acquisition of the drum plants, or in their location geographically. Following vehement denial by Mr. Blough that his firm had sought to buy drum plants, it was admitted that FTC had no concrete evidence that pressure had been brought to force disposal to the steel firms.

While additional hearings will be held, no definite date for continuance has been set by the committee.

Supreme Court Rules Plant Guards May Now Join Workers Unions

Washington

• • • **Plant guards** are employees under the terms of the National Labor Relations Act and as such may join the same union as production workers, the Supreme Court held in reversing two Circuit Court decisions on May 19. The cases concerned guards at Jones & Laughlin's Otis works, Cleveland, and those of E. C. Atkins & Co., Indianapolis tool and special steel manufacturers.

J & L lost its case on a 5 to 4 decision; Atkins on a 6 to 3 opinion. In the former case the Cincinnati Circuit Court found in favor of J & L, holding that while the guards were employees they were not entitled to belong to a production workers' union. The guards' obligations to the public were incompatible with those to the union, the lower court had held.

Justice Murphy, who wrote the majority opinion in both cases, stated that the guards "bear essentially the same relation to management as maintenance and production employees." The steel companies had argued that the guards were "employers" under the terms of the Wagner Act, coming under the definition of "any person acting in the interest of an employer, directly or indirectly."

The crux of the majority opinion appeared to be summed up in the finding that "in guarding the plant and personnel against physical danger, the guards represent the management's legitimate interest in plant protection, but that function is not necessarily inconsistent with organizing and bargaining with the employer on matters affecting their own wages, hours and working conditions."

WINS FIRST: *Floyd G. Matthews, twenty-five year old ex GI foundry apprentice of Caterpillar Tractor Co., Peoria, won first prize in the Apprentice Molding Contest, Grey Iron Division of the American Foundrymen's Assn. For the fourth straight year a Caterpillar entry carried off the* $100 *prize.*

Mullins Net Profit Soars

Warren, Ohio

• • • **Mullins Mfg. Co.** has reported net profit of $959,585 for the first quarter, compared with a 1946 first quarter loss of $687,997. when company plants operated only three weeks in the entire quarter because of strikes.

First quarter operations this year were about 65 pct of capacity, due to shortages of steel, shipping crates and railroad cars, as well as loss of about two weeks' time because of the gas shortage.

Gross sales were $7,589,834 compared with $929,480 a year ago.

Says Construction Cancellations Low but Postponements High

No Definite Figures Given But Some Companies Say They Run Into the Millions

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By GEORGE F. SULLIVAN
Ass't News Editor

o o o

New York

• • • **Reports of large scale** cancellation of construction contracts are not borne out by a survey of a dozen of the country's largest contractors. But postponements running into large figures were admitted by almost every single firm interviewed. Where figures were given most of these companies revealed that their postponements ran "into the millions."

Cancellations were in the minority though most firms stated that there had been some. The proportion of cancellations was reported to be small and nowhere nearly comparable to the percentage of postponements. Several firms reported that they had experienced no cancellations at all.

Uncertainty headed the list of reasons for postponements: uncertainty over delivery dates and the definite probability of further wage increases with their effect on basic material and on construction costs.

One construction company spokesman, whose firm does little or no building for speculative investors, said he believed that if the uncertainties were removed price would not loom so large. Costs are now about 100 pct over what they were before the war, he said, but prospective builders can't be sure there won't be another 50 pct increase before their jobs could be finished.

Contractors say most of their purchase contracts contain escalator clauses. Even eliminating the labor wage enigma most agree that this alone would prevent them from making a firm bid. Thus almost all contractors' bids are on a cost plus or a fixed fee basis at this time.

Unbalanced materials supply was also cited as a prime factor in the current wave of deferments. Convector radiation delivery delays held up one job for 6 months —converting that project from the black to the red. Shortages of cast iron and extended deliveries on fractional horsepower motors are further impediments to efficient planning. And of course there isn't enough structural steel at the moment to go around, according to these sources.

Labor trouble is another headache, contracting firms report. In the New York area bricklayers currently getting $2.50 an hr are asking for $2.75. Many believe they'll get it, and if they do the plasterers will undoubtedly want a raise. Some jobs, even small veteran's housing projects, have been held up for weeks, over such minor union jurisdictional matters as who shall dig a piping ditch. One was settled by having the ditch filled in and reopened by another union.

Accurate data on the time length of the deferments can not be had now. A number of contracting executives set a period of a year to a year and a half before they obtained firm orders on them. At least one company sees little new bridge building jobs for the next 6 months but believes bridge erectors will be in a building mood late this year and in 1948.

Several contractors stated that if material flow could be brought into balance and jurisdictional strikes ended construction costs would drop 20 to 30 pct by the end of 1948. Most agree that costs have now reached their peak; some see a leveling off and even a minor decline in some items.

The overall picture, on the record, is not as gloomy at the moment as some believe. The American Institute of Steel Construction reports first quarter 1947 shipments of fabricated structural steel at 405,542 tons, 37 pct greater than the average for the 5 prewar years 1936 to 1940. However, March shipments totaling 134,011 tons, were only 1220 tons better than the previous short month of February.

Bookings, according to the institute, were 147,706 tons in March. This compares with 124,172 and 104,095 tons in February and January 1947 respectively. The backlog reported by the steel construction institute for the next 4 months is 614,023 tons—almost twice the backlog figure of 313,635 tons for the average prewar years 1936 to 1940.

STEEL "GANG" IN MOSCOW: *With the world's largest standing army the Russians are forced to put women to work on heavy jobs. These women are working on a Moscow building job which is manned mostly by women.*

Canmakers Estimate 1.4 Million Tons of Plate for '47 Food Pack

Decline of 10 Pct Seen Due To Overstocked Shelves; Poor Crop Weather

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By JOHN ANTHONY
Eastern Regional Editor

o o o

New York

• • • **Can manufacturers are** anticipating a major change in the pattern of the distribution of their products during 1947 in which food packs may be expected to decline by 10 pct from the estimated 1947 pack, perhaps more. Tin mill products estimated as required for the 1947 fruit and vegetable pack at the Can Makers Institute meeting last November was 1.6 million tons.

This development is caused by very poor crop weather so far this year. The Florida citrus pack is well below normal because of a severe late freeze. Poor weather for peas will likely cause the bunching of the early and late crops and packing facilities will be pressed to handle all offerings.

In addition, inventory statistics indicate that wholesalers and retailers are overstocked with canned foods at high prices from the huge 1946 pack. These interests are having considerable difficulty in moving canned foods to the ultimate consumer at prevailing prices. Packers will be required to invest heavily at current produce prices without a good prospect for early distribution to wholesalers and dealers.

There has been a great deal of discussion of the government's program of support for farm prices in order to encourage production here for famine relief abroad. It is not generally recognized that government support is limited almost solely to cereals, food grains and oil bearing products such as soy beans. Government purchases of processed food products for foreign relief is relatively small and the packers cannot rely on it for financial assistance.

Canmakers, no longer restricted by government controls to specified tonnages of tin mill products by types of canned product, expect to be able to divert a larger proportion of their products to non-food packing requirements. Demand for cans for motor oils and beer during 1947 is reported to be very great. One producer estimates that the oil industry demand is about three times prewar demand.

It is estimated that the beer industry has called for 2 billion cans in 1947; however the industry does not expect to be in a position to produce this volume from tin mill tonnage which will be made available to it. W. C. Stolk, vice-president, American Can Co. recently stated that his company alone would produce 2 billion beer cans in 1948. The industry's production of beer cans in 1941 was 1.4 billion. Cans represented only 13.3 pct of the packaged beer volume in 1941. In that year packaged beer represented 56.1 pct of tax paid beer withdrawals. By 1946, this figure had grown to 66.6 pct, almost 100 pct bottled. The market for beer cans would seem to offer prospects for expansion.

Canmakers are anticipating shipments in 1947 of a larger tonnage of tin mill products than forecast last year in CPA figures. Steel producers have estimated that 4.4 million tons would be shipped in 1947, contrasted with the previously estimated 3.8 million. This figure is based on 3.6 million 1946 production, plus 400,000 tons to compensate for the 5-week shutdown in 1946, plus 400,000 tons increased output from new facilities. The latter production would take place principally in the last quarter of 1947 and would not be likely to be reflected in canmakers shipments this year.

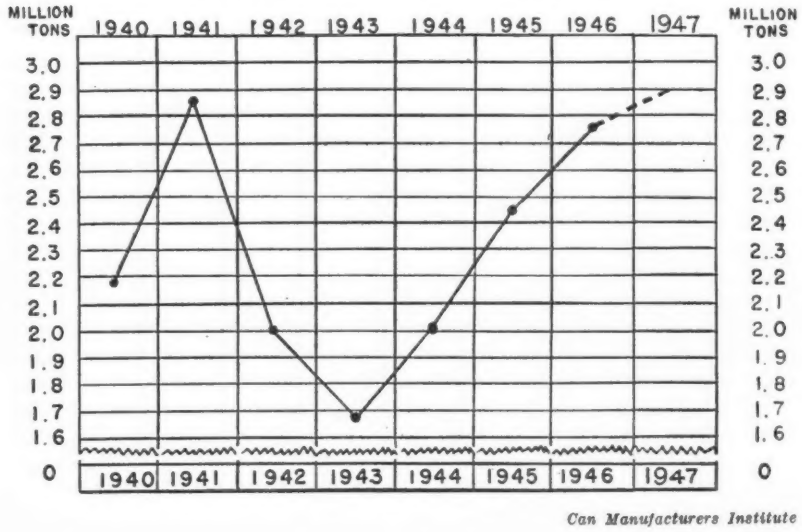
Monthly production of tin mill products in the first 6 months is estimated at somewhat in excess of 300,000 tons. These figures are significant when contrasted with prewar steel consumption in metal can shipments: 1940, 2.2 million tons; 1941, 2.8 million.

Requirements worked out by the industry last November in consultation with CPA were as follows:

Uses	Steel Short Tons	Tin Long Tons
Metal cans	3,457,000	24,417
Closures	250,000	440
Miscellaneous	100,000	1,000
Canada	125,000	1,230
Other export	400,000	4,690
Total	4,332,000	31,777

With steel requirements for the industry in 1947 estimated at 4.3 million tons, and an estimated production of tin mill products during the year of 3.8 million tons it is obvious that there must be a cutback in production of metal cans to the extent of 500,000 tons since the other items are firm requirements.

Steel Consumed in Metal Can Shipments



Can Manufacturers Institute

This is expected to bring canmakers tonnages down from 3.4 to 2.9 million tons. In order to assure adequate distribution to the most essential needs, canmakers established allocation programs to which they adhered. Estimated requirements are believed to have been higher than necessary for one canmaker has announced the end of its allocation program by July.

Steel requirements for canmakers products were estimated last November to be as follows:

Uses	Steel Short Tons	Tin Long Tons
Fruit, vegetables, etc...	1,601,000	14,414
Evaporated milk	276,000	3,335
Condensed milk	15,000	116
Other dairy products ...	33,000	225
Meat, poultry	156,000	1,476
Fish, sea food	113,000	900
Lard, shortening	56,000	102
Coffee	147,000	258
Beer	197,000	905
Pet food	99,000	265
Anti-freeze	28,000	66
Lubricating oils	270,000	468
Paint	143,000	644
Tobacco	54,000	13
All other non-food products	265,000	1,230
Total	3,457,000	24,417

See Minimum Wage Boost Following Ban On Portal-to-Portal Pay

Washington

• • • **Signing of the** portal-to-portal pay bill by President Truman on May 14 eliminates most of the pending court claims of almost $6 billion. Many of these suits involved steel cases. Total suits filed by the USWA aggregated $618 million. The President's request that minimum wages be increased to 65¢ per hr has apparently been received favorably by Congress.

The three principal things the new law does are:

(1) In general, future claims would be barred unless they were based on firm contracts or were recognized as past custom or practice.

(2) The statute of limitations for future claims was set at 2 years, and existing claims must be filed within 120 days, in which case the state statute of limitations will govern. If past or existing cases are not filed within 120 days after enactment, the 2-year limitation or the state limitation will apply, whichever is shorter.

(3) Employers complying in good faith with administrative rulings would also be exempt from penalties. In addition to permitting reliance on past and future administrative rulings, the measure also permits a court in its discretion to award less than the liquidated damages which are now mandatory under the Fair Labor Standards Act. It also relieves from liability employers who were exempt under an "area of production" regulation for acts or omissions occurring prior to Dec. 26, 1946.

In signing the law, the President asked Congress to raise from 40¢ to at least 65¢ an hr the minimum wage requirement of the 1938 Fair Labor Standards Act. Congress greeted this suggestion favorably and the House and Senate Labor Committees are preparing for hearings to comply with the President's recommendation.

Reduce Prices On Extruded Magnesium

Midland, Mich.

• • • **The Magnesium Div.** of Dow Chemical Co. has announced significant reductions in the base prices of extruded round rod, square and hexagonal bar, solid shapes and rectangles, and tubing effective Apr. 21. The new prices are slightly higher than those in effect from Nov. 12, 1946, to Mar. 3, 1947. In addition there is an appreciable reduction in the extras applicable for the chrome pickle surface finish. Other extras, including length and length tolerances, transportation allowances, etc., remain the same. The base order quantity per item of 30,000 lb or over remains unchanged.

In order to bring down the cost of fabricated magnesium products the company has established commercial grade specifications for Dowmetal M and FS. These grades have mechanical properties which can be expected to exceed 90 pct of the minimum values of the specification grades as listed in the company's products standards. Neither compositions nor properties of commercial grade alloys will be guaranteed or certified. Chemical compositions are as follows:

	Dowmetal M	Dowmetal FS
Aluminum	....	2.5-3.5
Manganese (min.)	1.20	0.20
Zinc	....	0.6-1.4
Silicon (max.)	0.30	0.30
Copper (max.)	0.10	0.10
Nickel (max.)	0.03	0.03
Impurities (max.)	0.30	0.30
Magnesium	Balance	Balance

Prices for extruded round tubing, formerly quoted on the basis of weight per lineal foot in pounds, are now quoted on outside diameter coupled with wall thickness in inches.

MERIT MEDAL FOR MURRAY: *Secretary of War Robert P. Patterson last week presented the Medal for Merit to Philip Murray, CIO president. The award was for the union leader's services "in connection with the mobilization and leadership of American workers throughout the industrial emergency existing during the Second World War."*

Senate Subcommittee Starts "Gray Market" Steel Hearings

Washington

• • • **Ramifications of the** steel "gray market" and the inability of some manufacturers to get sufficient steel are questions which a Senate Small Business subcommittee is studying in hearings which began here on May 14.

Witnesses told of having bought or having been offered sheet steel at prices ranging up to 12½¢ per lb. Belief was expressed that the "bootleg" price might go as high as $300 a ton by the end of the year.

Belief in Washington that "bootleg" sheet steel prices might reach $300 *by the end of the year is not substantiated by recent* IRON AGE *Surveys of "gray market" activity. See* THE IRON AGE, *Feb.* 20, *p.* 97, *and Mar.* 13, *p.* 101—*Ed.*

Appearing before the Senate group during the first 2 days were: Sydney Raphael, secretary, Hollow Metal Door & Buck Assn., New York; Herman Seer, vice president, Triangle Steel Products Corp., New York; M. M. Kohnstamm, purchasing agent, Morrison Steel Products, Inc., Buffalo; Joseph Markel, president, Markel Electric Products Co., Buffalo; Augustus C. Studer, Jr., receiver, Stangard-Dickerson Corp., Newark, and John Vernon Quarles, Mr. Studer's associate.

Steel producers were virtually absolved from suspicion of any complicity in gray market deals by the complaining manufacturers. Their chief quarrel with the steel companies was that the voluntary quota system and the basing period (1939-41) in effect deprives them of sharing in current production.

However, the steel mills were sharply criticized for what was termed loose supervision of distribution.

"It would seem," said one witness, "that the distribution of steel is not being supervised by the mills with that degree of care which the best interests of our national economy would dictate."

A case in point was cited by Mr. Quarles where, in order to keep from closing the Stangard plant, 50 tons of sheet was bought at $240 a ton. This shipment was located on a remote siding in New York City and was packaged for export.

Another manufacturer cited an instance in which he was offered 1000 tons of sheet by a New York firm at the market price plus a commission of $30 a ton. The order, the caller specified, should be made out to the U. S. Steel Corp. This was reported to the Steel Corp. which advised that the firm was not a qualified agent or representative of the company and that the Corporation did not believe it could deliver.

Witnesses Clear Steel Mills But Criticize Failure To Watch Distribution

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Consensus was that the steel shortage was not easing at all insofar as the new and small manufacturer was concerned.

"There is no possibility of a reduction of prices in many items until the steel price inequalities are rectified," a manufacturer of doors and housing items said. He added that under gray market prices for sheet, prices of certain items would have to be increased instead from $7 to $11 each.

In instances where gray market operators are known, the Senate subcommittee will attempt to find out how they operate and the sources from which they obtain the steel they sell at premiums.

A Federal Trade Commission official, who is connected with the FTC study of gray markets and other steel problems (THE IRON AGE, Apr. 3, p. 101), has been attending the hearing and listening attentively to the testimony.

Some firms are now operating at 50 pct of capacity, it was said, although the backlog of orders would justify expansion. However, testimony would indicate that instead of trying to squeeze out new customers, the steel plants are leaning over backward to try to get some steel to these users. Several cases were cited in which mills were supplying small quantities to companies they had not previously supplied.

Steel Rail Bar Group Discuss New Advances As Result of Research

Chicago

• • • **The annual meeting** of the Rail Steel Bar Assn. was held at the Edgewater Beach Hotel, Chicago, on May 8 and May 9 with every member company represented. Interest was unusually high as there has been an appreciable increase in research work of the association during the past year. The new concrete bar bending machines which have been made and tested show considerable improvements over any previously used.

The Reinforced Concrete Research Committee reported that they had made definite progress in meeting the demand from the consulting engineers and architects for deformations which will considerably increase the adhesion of concrete to the bars. Several of the member companies are now prepared to roll revised patterns of deformations which will also be of value in preventing cracking of concrete at points of maximum stress.

The raw material situation was discussed by the conference members and the conclusion was that the delivery picture has eased since the first of the year. The quantity of available rerolling rails has increased and the market price has gone down. Steps have been taken to assure improved grading and classification of rerolling rails with the thought that the industry can afford to bid higher for raw material that is properly graded. The association adopted the plan that during the next few weeks they will concentrate on obtaining the cooperation of the railroads in securing rerolling rails. Several of the larger railroads have already promised full cooperation.

At the conclusion of the conference the association elected some honorary members in view of their very active organizational support through the years. The men elected are F. G. Carrel of Franklin Steel Works; Julian A. Pollak of Pollak Steel Co. and W. W. Scott, Jr., of Laclede Steel Co.

Weekly Gallup Polls . . .

Majority Approve of Piecework as Basis for Pay

Princeton, N. J.

• • • **One of the great** problems facing nations of the world in this postwar period is production—how to turn out more goods—according to George Gallup, director, American Institute of Public Opinion.

In this country production has been put forward as one means of alleviating the inflationary spiral now in progress.

In Britain, production is regarded as the means of salvation for a sorely hurt economy.

In Russia, badly battered during the great German offensive, the emphasis is upon production.

Russia has in fact recently expanded its use of the piece-rate method of reward for work as a means of stimulating production. It has now been expanded to include agricultural workers, who formerly were rewarded on a combination time-and-piece-rate basis.

With this in mind, the institute conducted a nationwide poll among voters to measure beliefs about and sentiment toward piecework payment of a fixed amount for each piece of work done. A similar survey was conducted in Britain by the British Institute of Public Opinion, affiliate of the American Gallup Poll.

The questions in the survey:

(1) "Do you agree or disagree that production per man must go up before wages can be increased by factories or industry?"

United States

	Pct
Agree	53
Disagree	33
No opinion	14

Britain

	Pct
Agree	69
Disagree	20
No opinion	11

(2) "Do you approve or disapprove of paying for work on piecework basis?"

United States

	Pct
Approve	59
Disapprove	28
No opinion	13

Britain

	Pct
Approve	50
Disapprove	30
Qualified approval	7
No opinion	13

(3) "Do you agree or disagree that payment on a piecework basis is likely to increase production in most factories?"

United States

	Pct
Agree	75
Disagree	12
No opinion	13

Britain

	Pct
Agree	66
Disagree	20
No opinion	14

Piecework as a basis for pay has of course a long history both here and abroad.

At the present time, it is used in United States with great success in some industries. The garment industry provides one outstanding example. The International Ladies Garment Workers Union estimates that 90 pct of the garment industry operates on a piecework basis.

Among the rank and file of union members in United States, thinking on today's questions does not differ greatly from the rest of the country, except on the first question—whether wages can go up without production increases.

The union vote on this question shows 38 pct agreeing that production must go up before wages can be increased, 50 pct disagreeing, 12 pct without any opinion on the question.

Fifty-three percent of union members included in the survey approve of paying for work on a piecework basis. Seventy-three percent of them agree that payment on such a basis will increase production in most factories.

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There have been two major points of view: (1) The government should guarantee jobs for people. (2) The government should limit itself to making sure there are opportunities for people to get jobs.

In a nationwide poll, the institute has measured public attitudes toward these two points of view.

Various Population Groups Express Sharp Differences On Role of Our Government

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People engaged in professions or business incline to think the government should limit itself to providing opportunities. Manual workers, union members, are inclined to want to see the government guarantee jobs. Farmers and white collar workers favor a limited role for government.

A majority of Democrats are found favoring an active, job-guaranteeing role for the government. Republicans favor limiting government activity to making opportunities.

These findings emerge from questioning as follows:

"Which one of these statements do you most agree with?"

(The person being interviewed was handed a card.)

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The results tabulated for all voters:

	Pct
Make sure opportunities are there	50
Gov't should guarantee jobs	43
No opinion	7

A comparison of thinking in various occupational groups, especially the professional and business group with the manual worker or the union member groups shows the sharply contrasting thinking on the role of government:

OCCUPATIONS

	Limit to Opportunity to get Ahead Pct	Gov't Should Guarantee Jobs Pct	No Opinion Pct
Professional & business	67	28	5
White collar	57	38	5

(CONTINUED ON PAGE 146)

Senate Subcommittee Starts "Gray Market" Steel Hearings

Washington

• • • **Ramifications of the** steel "gray market" and the inability of some manufacturers to get sufficient steel are questions which a Senate Small Business subcommittee is studying in hearings which began here on May 14.

Witnesses told of having bought or having been offered sheet steel at prices ranging up to 12½¢ per lb. Belief was expressed that the "bootleg" price might go as high as $300 a ton by the end of the year.

Belief in Washington that "bootleg" sheet steel prices might reach $300 by the end of the year is not substantiated by recent IRON AGE *Surveys of "gray market" activity. See* THE IRON AGE, *Feb. 20, p. 97, and Mar. 13, p. 101—Ed.*

Appearing before the Senate group during the first 2 days were: Sydney Raphael, secretary, Hollow Metal Door & Buck Assn., New York; Herman Seer, vice president, Triangle Steel Products Corp., New York; M. M. Kohnstamm, purchasing agent, Morrison Steel Products, Inc., Buffalo; Joseph Markel, president, Markel Electric Products Co., Buffalo; Augustus C. Studer, Jr., receiver, Stangard-Dickerson Corp., Newark, and John Vernon Quarles, Mr. Studer's associate.

Steel producers were virtually absolved from suspicion of any complicity in gray market deals by the complaining manufacturers. Their chief quarrel with the steel companies was that the voluntary quota system and the basing period (1939-41) in effect deprives them of sharing in current production.

However, the steel mills were sharply criticized for what was termed loose supervision of distribution.

"It would seem," said one witness, "that the distribution of steel is not being supervised by the mills with that degree of care which the best interests of our national economy would dictate."

A case in point was cited by Mr. Quarles where, in order to keep from closing the Stangard plant, 50 tons of sheet was bought at $240 a ton. This shipment was located on a remote siding in New York City and was packaged for export.

Another manufacturer cited an instance in which he was offered 1000 tons of sheet by a New York firm at the market price plus a commission of $30 a ton. The order, the caller specified, should be made out to the U. S. Steel Corp. This was reported to the Steel Corp. which advised that the firm was not a qualified agent or representative of the company and that the Corporation did not believe it could deliver.

Witnesses Clear Steel Mills But Criticize Failure To Watch Distribution

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Consensus was that the steel shortage was not easing at all insofar as the new and small manufacturer was concerned.

"There is no possibility of a reduction of prices in many items until the steel price inequalities are rectified," a manufacturer of doors and housing items said. He added that under gray market prices for sheet, prices of certain items would have to be increased instead from $7 to $11 each.

In instances where gray market operators are known, the Senate subcommittee will attempt to find out how they operate and the sources from which they obtain the steel they sell at premiums.

A Federal Trade Commission official, who is connected with the FTC study of gray markets and other steel problems (THE IRON AGE, Apr. 3, p. 101), has been attending the hearing and listening attentively to the testimony.

Some firms are now operating at 50 pct of capacity, it was said, although the backlog of orders would justify expansion. However, testimony would indicate that instead of trying to squeeze out new customers, the steel plants are leaning over backward to try to get some steel to these users. Several cases were cited in which mills were supplying small quantities to companies they had not previously supplied.

Steel Rail Bar Group Discuss New Advances As Result of Research

Chicago

• • • **The annual meeting** of the Rail Steel Bar Assn. was held at the Edgewater Beach Hotel, Chicago, on May 8 and May 9 with every member company represented. Interest was unusually high as there has been an appreciable increase in research work of the association during the past year. The new concrete bar bending machines which have been made and tested show considerable improvements over any previously used.

The Reinforced Concrete Research Committee reported that they had made definite progress in meeting the demand from the consulting engineers and architects for deformations which will considerably increase the adhesion of concrete to the bars. Several of the member companies are now prepared to roll revised patterns of deformations which will also be of value in preventing cracking of concrete at points of maximum stress.

The raw material situation was discussed by the conference members and the conclusion was that the delivery picture has eased since the first of the year. The quantity of available rerolling rails has increased and the market price has gone down. Steps have been taken to assure improved grading and classification of rerolling rails with the thought that the industry can afford to bid higher for raw material that is properly graded. The association adopted the plan that during the next few weeks they will concentrate on obtaining the cooperation of the railroads in securing rerolling rails. Several of the larger railroads have already promised full cooperation.

At the conclusion of the conference the association elected some honorary members in view of their very active organizational support through the years. The men elected are F. G. Carrel of Franklin Steel Works; Julian A. Pollak of Pollak Steel Co. and W. W. Scott, Jr., of Laclede Steel Co.

Weekly Gallup Polls . . .

Majority Approve of Piecework as Basis for Pay

Princeton, N. J.

• • • **One of the great** problems facing nations of the world in this postwar period is production—how to turn out more goods—according to George Gallup, director, American Institute of Public Opinion.

In this country production has been put forward as one means of alleviating the inflationary spiral now in progress.

In Britain, production is regarded as the means of salvation for a sorely hurt economy.

In Russia, badly battered during the great German offensive, the emphasis is upon production.

Russia has in fact recently expanded its use of the piece-rate method of reward for work as a means of stimulating production. It has now been expanded to include agricultural workers, who formerly were rewarded on a combination time-and-piece-rate basis.

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(CONTINUED ON PAGE 146)

Commerce Dept. Again Says Iron, Steel Study Recommends Nothing

Washington

• • • **The iron and steel** survey being made by the Office of Domestic Commerce, Dept. of Commerce, will not deal with controversial questions of future demand and its relation to productive capacity.

This announcement, made by the Department, confirms a statement made to THE IRON AGE by H. B. McCoy, director of the Department's Office of Domestic Commerce which is making the survey. It is evident the Department issued the statement to refute published reports that the survey would make various recommendations. Mr. McCoy said that there will be no recommendations.

While the statement said completion of its survey is expected in the near future, doubt has been expressed that it will make the deadline of July 1, which had been set. It was pointed out that it is taking longer than had been expected to gather some of the material. Also, it was said, parts of the reports which have been sent to the industry for comment and suggestions are not being returned as soon as it was expected.

The survey, it was stated, is one of a series of basic economic reports which the Industry Div. of the Office of Domestic Commerce is making to give a comprehensive picture of the complex structure of basic American industries.

The statement, listing an outline of 14 general subjects to be covered in the report, says the list is tentative and may be revised. The list has only minor changes as compared with the outline published in THE IRON AGE of Apr. 3, p. 102.

"In planning this survey," the statement said, "it was decided to limit it to background information, the up-to-date basic situation and the analysis of present capacity and operation so that it could be used as an accepted benchmark for any future separate studies of the outlook and the possible need for expansion to provide for full production by industries that use iron and steel."

Meanwhile, it has been learned, that one proposed steel report has been abandoned. Because of lack of funds it was stated at the Commerce Dept. that the proposed CPA report on iron and steel will not be prepared. The Department has taken over the remnants of CPA since its recent liquidation.

Places Big Bessemer Steel Converter Order

New Castle, Pa.

• • • **Pennsylvania Engineering Corp.,** New Castle, Pa., has been awarded a contract by National Tube Co. to build a new bessemer plant at the Lorain Works of the company at Lorain, Ohio.

Included in the contract are four 25-ton bessemer converters, two 800-ton hot metal mixers, blast piping, transfer cars and auxiliary equipment. The new plant was announced some time ago by National Tube and when completed will produce bessemer seamless tubing.

Pennsylvania Engineering is also building two 25-ton bessemer converters with auxiliary equipment for Great Lakes Steel Corp., Detroit. It is expected that these converters when installed will be used for supplying hot metal to Great Lake's openhearths, similar to the technique now used at the Weirton Steel Co., other steel subsidiary to National Steel Corp.

Final shipments are being made now on a bessemer converter plant for the Monterey Steel Co., of Mexico, and Cia. Acos Especiaias, Itabira, Brazil.

In order to take care of the machining of large pieces of equipment, the company has recently installed a 24 ft diam boring mill. According to William S. Wheeler, president of Pennsylvania Engineering, the company has enough orders now on the books to assure steady operations for 18 months.

GUNS TO GONDOLAS: *Woolwich Arsenal, Britain's best known war plant is now building* 80 16-*ton steel freight cars a week. Here a group of welders apply steel side sheets to cars on the arsenal's assembly line.*

Russian Pig Iron Output Aided With New Furnace

Washington

• • • **Russia is stepping** up its pig iron production beginning with a completely mechanized blast furnace which has a capacity of 1143 cu m, a six-fold increase over its capacity in 1931, when its output amounted to 231,000 tons, according to the Dept. of Commerce's Foreign Commerce Weekly. This unit, named after Kirov, is Blast Furnace No. 1 of the restored Makeyevka metallurgical plant in the Ukraine.

It will have 4 of the 45 blast furnaces which are scheduled to be in operation during the latest 5 year plan. Pig iron production of the plant is expected to be 20 pct higher than the prewar output. The total USSR production goal for 1950 is 19,500,000 tons.

Weirton Steel Starts Mile-A-Minute Cold-Reduction Strip Mill

Weirton, W. Va.

• • • **The first cold-reduction** strip mill capable of rolling strip for tinplate at a 5000 fpm rate last week went into full scale operation at Weirton Steel Co.'s Weirton plant. The new No. 6 mill will roll strip mainly in tinplate gages, from 0.006 to 0.015 in. thick, but will be able to roll thicker gage strip steel if required. Its operation will make possible a 50 pct increase in the production of tin mill products.

The new mill, built by United Engineering & Foundry Co., is the first cold reduction mill to utilize twin-motor drives; i.e., motor drives on both of the work rolls in an individual roll stand. This practice is not new in hot rolling, Carnegie-Illinois Steel Corp. having two such units at South Chicago, one at Edgar Thomson Works, and two at its Homestead Works. (See "Twin Motor Drives in Hot Reducing Mills, by Frank W. Cramer, THE IRON AGE, Oct. 11, 1945, p. 58.)

The 42-in. cold mill operates at such speeds that the practice is to weld together four lengths of hot mill bands. Thus, a maximum finished coil, 26,000 ft long, weighing up to 30,000 lb, can be handled. The backup and work rolls and the spindle carriers of the five stand tandem mill are operated hydraulically. The winding reel at the delivery end of the mills will handle coils from 16 to 66 in. in diameter. The combined input of direct power for rolling is 17,550 hp.

Westinghouse Electric Corp. built the electrical equipment for the mill. The first stand is powered with a 1750-hp motor, directly connected through a pinion stand to the work rolls. The second stand is powered by a 3500-hp motor connected in the same manner. The No. 3 stand is powered with a double armature 3500-hp motor connected through a pinion stand to the work rolls.

The fourth stand is powered with two 1750-hp motors, one connected to each work roll through a speedup gear assembly. The roll speed is synchronized through the mechanical action of both rolls gripping the strip and through

Twin-Motor Drives and Total Of 17,550 Hp in New Unit Mainly for Tinplate

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electrical control of the division of power load between the two motors. The last stand has the same setup as the fourth—twin-motor drives—but is powered by two 2250-hp motors.

The mill has not yet been run to capacity speeds mainly because of inadequate power facilities and because the operating crew is not completely familiar with its operation. To provide sufficient power, a new power substation is being built near the strip steel plant and a new 25,000-kw turbogenerator is being installed at the main power plant. Steam for the generator will be provided by a new high pressure 325,000 lb per hr boiler, and the power load will be transmitted from the main plant to the substation over new high tension transmission lines.

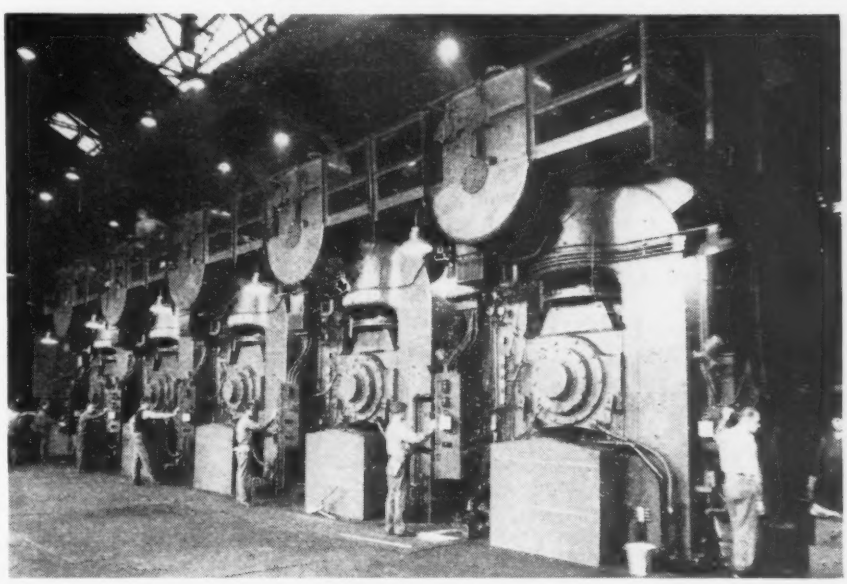
This development work by Weirton Steel Co. is part of the $20 million expansion plan announced some time ago. The work described along with additional coke oven facilities will complete the program, and it is anticipated that the work will be finished late this summer. In conjunction with the coke facilities expansion, coke oven gas will be piped through a new pipeline from the Weirton plant to the Steubenville, Ohio, plant (across the river), thus freeing the entire Weirton Steel Co. operation from the necessity of purchasing gas.

WAA Declines Bids

Washington

• • • **Declining as** inadequate all bids for the Torrence (Los Angeles) aluminum plant, WAA has recommended that the machinery and equipment at the site be dismantled and removed for possible utilization in other locations. This unusual action was based on WAA's view that to leave the property dormant in its present condition would result in an expenditure of approximately $75,000 annually for protection and maintenance. Also, WAA said, deterioration of equipment would result in decreased value of the plant.

MILE A MINUTE: *This new 5000 fpm cold reduction mill at Weirton Steel Co., will permit Weirton to increase tinplate output by 50 pct. It rolls coils 26,000 ft long, weighing up to 30,000 lb. It is the first cold mill to utilize twin motor drives for work rolls, a feature incorporated into the fourth and fifth roll stands.*



. . . PERSONALS . . .

(CONTINUED FROM PAGE 104)

• **H. L. Pehrson** has been appointed manager of the West Coast sales of Ladish Co. His offices are located in Los Angeles. Mr. Pehrson for the past 16 years has been closely associated with the valve and piping business during which time he was employed by Reading Pratt & Cady Div. of American Chain & Cable Co.

• **Roy E. Fortner** and **Albert M. Pearson,** formerly credit assistants, have been appointed assistant credit managers of the Tennessee Coal, Iron & R.R. Co., Birmingham. Mr. Fortner will handle credit matters originating in the eastern section of the company's territory, Mr. Pearson those originating in the western.

• **George M. Lund** has been appointed president of the Despatch Oven Co., Minneapolis, succeeding the late H. L. Grapp. He has for many years been comptroller, vice-president and assistant to the late president of the company. Mr. Lund has the support of **C. P. Doherty,** executive vice-president and general manager, whose appointment to this new post is preceded by 28 years' experience with the company. Other officers and directors appointed include **G. L. Schuster,** new vice-president-treasurer and chief engineer; **Fred Larson,** vice-president-secretary and chief electrical engineer; **Mrs. Ida S. Grapp,** director; and **John W. Watson,** vice-president, who is in charge of the Despatch branch in Chicago.

• **John H. Staiger** succeeds L. J. Bohan as representative in the Chicago territory of the Michiana Products Corp. **William A. Zach** has been appointed representative in the Indiana territory. Mr. Zach has had experience at the Michiana plant as assistant chief engineer. His headquarters will be at the Michigan City, Ind. plant.

• **Charles V. Cole** has been appointed works manager of the National Motor Bearing Co., Inc. Prior to assuming duties at National Motor Bearing's Redwood City, Calif., plant, Mr. Cole was a management consultant to numerous industrial concerns operating in the San Francisco bay area.

• **Joseph Newman** has been appointed comptroller of Reo Motors, Inc., Lansing, Mich., succeeding the late **A. R. Kenny.** Mr. Newman served in a similar capacity with Federal Motor Truck Co.

• **Martin Oyamburu** has been elected chairman of the board following the recent death of **Angel Urraza,** former chairman of the board and president of the Compania Hulera "Euzkadi" S.A. of Mexico City, Mexico, with which the B. F. Goodrich Co. is associated. **Russell F. Moody** has been elected director general (president); **D. W. Johnson,** subdirector (vice-president) in charge of production, and **Edmund Phelan,** subdirector in charge of sales.

• **Eugene C. Bauer, Jr.** has been elected a vice-president of Kensington Steel Co., Chicago.

OBITUARY...

• **Don G. Gardner,** 58, president of Gardner Publications, Inc., Cincinnati, died May 15.

• **George Z. Lowe,** for nearly 40 years superintendent at William Allen Sons Co., Worcester, Mass., died recently.

• **Alexander T. Langlois, 50,** superintendent of maintenance, Westinghouse Electric Co., East Springfield, Mass., died recently.

• **John T. Swanson,** 70, president of the American Saw & Mfg. Co., Springfield, Mass., died May 7.

• **Levi W. Moen,** 63, former head of the engineering department of Lamson Corp., Syracuse, N. Y., died May 8 after a long illness. He retired from the Lamson Corp. about 2 years ago.

• **Reginald Steel,** 85, president and founder of R. Steel & Sons, Inc., of Long Island City, N. Y., died May 9.

• **Woodburn C. Winings, 54,** manager of Goodyear Tire & Rubber Co.'s mechanical goods division, Akron, Ohio, and associated with the firm 32 years, died May 10 after a short illness.

• **F. L. Farrell,** vice-president of the Aluminum Co. of Canada, Ltd., Montreal, died Apr. 22.

Coming Events

May 26-27 Assn. of Iron & Steel Engineers, annual spring conference, Philadelphia.

May 27 Metal Powder Assn., spring meeting, New York.

June 2-4 American Gear Manufacturers, Hot Springs, Va.

June 5-7 Electric Metal Makers Guild, Inc., annual meeting, Pittsburgh.

June 9-11 American Coke & Chemical Institute, annual meeting, French Lick, Ind.

June 15-19 American Society of Mechanical Engineers, semiannual meeting, Chicago.

June 16-20 American Society for Testing Materials, annual meeting, Atlantic City, N. J.

June 17-19 Machinery Dealers National Assn., convention, Cincinnati.

June 23-27 American Electroplaters Society, industrial finishing show, Detroit.

June 23-28 Railway Supply Manufacturers' Assn., Atlantic City, N. J.

July 14-18 American Society of Civil Engineers, Duluth, Minn.

Aug. 25-29 National Assn. of Power Engineers, Inc., Boston.

Sept. 8-12 Instrument Society of America, conference, Chicago.

Sept. 10-12 Porcelain Enamel Institute, Inc., Columbus, Ohio.

Sept. 17-26 National Machine Tool Builders' Assn., machine tool show, Chicago.

Sept. 29-Oct. 3 American Gas Assn., San Francisco.

The London ECONOMIST

Waging World Peace

Reprinted by special permission to further understanding on how political and economic affairs are viewed in London.

THE title of Mr. Walter Lippman's address to the convention of the U. S. Chamber of Commerce on Apr. 29 symbolizes the mixture of motives behind the very general public support of Marshall's summary of the Moscow conference, particularly in relation to its forecast of action in Western Europe. (The three phrases most often quoted in editorials were those in which the secretary said that this country will not "compromise on great principles for the sake of agreement," that "action cannot await compromise through exhaustion" and that "the patient is sinking while the doctors deliberate.")

The secretary gave no indication of what is going to be done to help the patient rise again: Press speculation, drawing in part on Mr. Dulle's broadcast and on Senator Vandenberg's speech, is anticipating a merger of the three Western zones of Germany, the raising of industrial levels, and the revitalization of the Ruhr.

How does such a program fit with the long term American objective for Germany? In 1945, at the end of the war, the announced American purpose was to denazify, to demilitarize, and to deindustrialize, especially in respect of war potential. Since then, unannounced short-term U. S. objectives have accumulated out of a series of case-by-case decisions. They are not necessarily compatible with previous declarations, even though attempts at reconciliation are being vigorously made.

The major reliance in such attempts is on the approach through the stomach. Mr. Hoover has documented the fact that the Germans, to use Mr. Roosevelt's famous phrase, are "ill-housed, ill-clothed, ill-fed." Mr. Hoover apparently also subscribes to the thesis that of the Four Freedoms, freedom from want is the most important as preparation for the understanding and practice of democracy.

Once accepted, the point that the Germans must have more in order to be good democrats—that no one can eat the Bill of Rights—leads to an upward revision of the level of industry. Reindustrialization affects the other two American short-term objectives regarding Germany.

More fertilizers would mean more food. But the elements that go into fertilizer, as a recent event in Texas City has illustrated, are also effective explosives. A stepped-up operation of fertilizer plants and other industrial capacity, moreover, would be more practicable if fuller use were made, in responsible positions, of the men whose know-how was evident under the Nazi regime.

THIS desire to give the Germans more, in order to aid them to be good democrats, runs wholly parallel to three desires which are not primarily related to the Germans: To provide some of the goods for which the whole of Europe cries out, to erect an effective bastion against the Russians, and to lighten the load on the American taxpayer and consumer.

The editorial comment of the Patterson group's Washington outlet, the *Times Herald*, summarizes succinctly:

Marshall, we're glad to see, doesn't fall for that One World piece of wishful thinking.

Our own feeling has long been that the best thing we could do would be to get out of Europe as fast as possible, leave it to go Communist if the Europeans haven't the guts to resist the Reds, and devote ourselves to girding the Western Hemisphere against any possible future attacks.

However, it is a safe bet that our present rulers have no idea of doing that, and the Vandenberg "Republicans" are going to go along with the Truman plan to fight communism with dollars around the world.

Under these circumstances it seems to us that the best thing we can do is to get Western Germany merged economically as soon as possible and help its industries step up nonmilitary production as fast as they can. . . .

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In doing all this, the Western Allies would not be acting out of any sob-sister pity for the Germans, who, after all, let Hitler lead them into that 1939 attack on Poland which precipitated World War II.

The object would be the cold and businesslike one of taking some of the present crushing loads off American, British and French—especially American—taxpayers, and stopping some of the drain on U. S. food which is helping to keep our own food prices so high.

THE cost to the United States of the future of Europe is a recurrent consideration. The *New York Times* may urge that it is "up to us to make it clear to Russia that whatever happens the United States will never again disinterest itself in Europe, and will never again attempt to stay aloof from conditions which twice involved us in Great Wars," but the *Detroit News* is thoroughly pertinent in noting that "the validity of this (the hopeful) view depends altogether on whether, in the long run, the policy agreed on by the American delegation will be given adequate financial support by the American people through their Congress."

Three instances of financial reluctance in relation to Germany have recently occurred. During consideration of the War Dept. deficiency Bill, an attempt was made in the Senate to attach an amendment requiring wider use of the fertilizer plants in the U. S. zone. The item of half a billion for nonmilitary expenditures in occupied areas has roused considerable protest. Secretary Marshall's first

(CONTINUED ON PAGE 146)

Industrial Briefs . . .

• SOVIET CONTRACT — Dresser Industries, Inc., Cleveland, has signed a contract with the Soviet Government to build a gas liquefaction plant 60 miles from Moscow. Construction will be started immediately and completed within the next year, according to the company. The plant will liquefy 175,000 cu ft of natural gas per hr and send it to the storage plant which will have a capacity of 160 million cu ft. When needed, the liquid will be re-gasified at the rate of 2 million cu ft per hr.

• TO HEAD GROUP — Robert Twells, plant manager of the Spark Plug Div. of The Electric Auto-Lite Co., was elected president of The Institute of Ceramic Engineers at their annual convention.

• ELECTED PRESIDENT—Roy C. McKenna, president and chairman of the board, Vanadium Alloys Steel Co., has been elected president of the Pennsylvania State Chamber of Commerce.

• ENGINE SHIPMENTS — Continental Motors Corp., Detroit, and wholly-owned subsidiaries have shipped 115,612 engines since Nov. 1, 1946, according to C. J. Reese, president of Continental Motors Corp. Shipments during the corresponding period a year ago totaled 61,288, Mr. Reese stated.

• WEST COAST OFFICE — The opening of a new Los Angeles warehouse and office at 1939 E. 16th St. devoted to servicing West Coast users of tool, alloy and stainless steels was announced by The Carpenter Steel Co.

• TO SELL BRASS PLANT — A $10-million brass casting and rolling plant, built in Chicago for wartime operation by Revere Copper & Brass, Inc., has been put on the block by WAA with June 30 as the closing date for bids.

• PURCHASES PLANT — The Wellman Bronze & Aluminum Co., Cleveland, has purchased the magnesium sand castings plant it operated during the war for $195,000. The company plans to continue production of this type of castings and to carry on experimental work in magnesium fabrication.

• BUYS COKE PLANT—Richard E. Randall, Seattle, Wash., has purchased the coke plant at Tacoma and coal mine facilities at Wilkeson which were operated during the war for the government by the Wilkeson Products Co. Sales price was $600,000, WAA said, and the facilities have a capacity for producing 100,000 tons of coking coal annually.

• OKAYS CONSTRUCTION—Office of Housing Expediter has approved construction by Illinois Tool Works, Elgin, Ill., of an additional factory building for production of screw products. The cost of the new facilities is estimated at $287,000. Approved at the same time were plans by the Urschel Laboratories, Inc., to build a $105,000 plant for production of food processing machinery.

• BUYS PROPERTY—The Beloit Iron Works, Beloit, Wis., has purchased the land and buildings of the R. J. Dowd Knife Works Div. of the Simonds Worden White Co. to be used for production expansion purposes. The Dowd operations will be merged with the company's plants at Cleveland and Dayton.

• INSTITUTE HEAD—George R. Wernisch, manager of the steel joist and roof deck division of Ceco Steel Products Corp., Chicago, was elected president of the Steel Joist Institute at the annual meeting of the institute's board of directors. James D. Maitland of Colorado Builders Supply Co. of Denver was named vice-president.

Pullman-Standard To Triple Output of Cars

Bessemer, Ala.

• • • **Pullman-Standard Car Mfg. Co. will triple its output of freight cars by mid-year. The company recently doubled the freight car output at its Michigan City, Ind., plant.**

Fred O. Reemer, company vice-president, said that by late June the Bessemer plant, which is the largest car-building plant in the South, should be delivering 50 or more cars daily. This means an average of one completed car every 10 min and is in sharp contrast to the plant's curtailed operations last year when lack of steel held it down to approximately one-third of capacity.

Total unshipped backlog in the Bessemer plant, as of May 1, called for 12,100 freight cars, all for domestic railroads. The first roads to benefit from the increased production will be the Southern Railway, with an order for 1000 automobile cars already more than half-way to completion; the Seaboard Air Line, which has 200 phosphate cars now in production, and the Louisville & Nashville, with 1250 hopper cars in the early stages of construction. Total working force of the Bessemer plant is now 1514 compared with the wartime high of 1451 workers in 1942.

Welding Association Meets

Philadelphia

• • • **Meeting in Philadelphia for their third annual convention, more than 100 members and guests of the National Welding Supply Assn. spent two days, May 5 and May 6, in spirited discussions of the many problems confronting their business.**

New officers of the association elected at this convention are: President, Ralph E. Chase, Chase Welding Supply Co., Benton, Ill.; senior vice-president, R. S. Mars, W. P. & R. S. Mars Co., Duluth, Minn.; vice-president, Howard Proctor, Acme Welding Supply Co., Houston; vice-president, W. T. Peters, Welders Supply Co., Portland, Ore.; vice-president, V. S. Rice, Virginia Welding Co., Charleston, W. Va.; vice-president, J. N. Alcock, Saginaw Welding Supply Co., Saginaw, Mich.

Construction Steel . . .

New York

• • • **A monthly increase** of 23,534 tons in bookings of fabricated structural steel was reported for the month of March 1947. March's estimated total bookings, according to reports received by the American Institute of Steel Construction, Inc., amounted to 147,706 tons as compared with 124,172 for the preceding month. The estimated total bookings for the first quarter was 375,973 tons, an increase of 14.5 pct over the average of 328,416 tons booked in the same period in the averaged 5 prewar years of 1936 to 1940.

March shipments totaled 134,011 tons. Shipments for the first quarter totaled 405,542 tons or 37 pct greater than the averaged 296,235 tons in the 5 prewar years. The tonnage available for fabrication within the next 4 months amounted to 614,023 tons.

Following is the complete tabulation of bookings and shipments:

	Estimated Total Tonnage for the Entire Industry 1947	Estimated Total Tonnage for the Entire Industry Avg. 1936-1940
Contracts Closed		
January ..	104,095*	107,578
February ..	124,172*	96,280
March	147,706	124,558
Total ...	375,973	328,416
Shipments		
January ..	138,740*	92,578
February ..	132,791*	88,626
March	134,011	115,031
Total ...	405,542	296,235
Tonnage available for fabrication within the next 4 months	614,023	313,635

*Revised

• • • **Fabricated steel awards** this week included the following:

900 Tons, Chicago, 130th St. bridge construction, William J. Howard, Inc., low bidder.

610 Tons, Chicago, alterations to Carson Pirie Scott Building to New City Iron Works of Chicago.

500 Tons, Louise, Ariz., gantry crane and lifting beam for Davis power plant, Bureau of Reclamation, Denver, Spec. 1645, to Star Iron & Steel Co., Tacoma, Wash.

495 Tons, Modesto, Calif., bridge across Stanislaus River, through Fredrickson and Watson, to Bethlehem Steel Co., Bethlehem.

450 Tons, Evanston, Ill., mill building for Krohumel, Heffron & Preiss Steel Co., to Wendnagel & Co., Chicago.

250 Tons, Chicago, Pulaski School building, Chicago Board of Education to Reuter Bros. Iron Works Co., Chicago.

220 Tons, Rhinelander, Wis., factory building to Wisconsin Bridge Co.

200 Tons, Litchfield, Minn., power plant to St. Paul Foundry Co., St. Paul, Minn.

150 Tons, Urbana, Ill., dormitory, University of Illinois to United Boiler Heating & Foundry Co., Hammond, Ind.

120 Tons, Kearny, N. J., United Engineers & Constructors, Inc., remodeling building, to American Bridge Co., Pittsburgh.

110 Tons, Phlox, Ind., Bridge No. 2727 to Central States Bridge Co.

100 Tons, Dalles, Ore., steel towers, Bonneville Power Administration Inv. 3954, to Westco Steel Fabricators, Inc., Oakland, Calif.

• • • **Fabricated steel inquiries** this week included the following:

1700 Tons, State of Michigan, Sault Ste. Marie bridge.

1320 Tons, Decatur, Neb., Missouri River bridge.

1125 Tons, Northport, Wash., Columbia River bridge, Director of Highways, Olympia, bids to be called about May 20.

1010 Tons, Oakland, Calif., overcrossing over East Shore Freeway at 23rd Ave., California Div. of Highways, Sacramento, bids to June 4.

700 Tons, Indianapolis, building for the News Publishers Co.

690 Tons, State of Wyoming, tunnel project. Bid 40-N-734Y.

655 Tons, Loveland, Col., tunnels 2, 3, 4 and 5, Horsetooth Feeder Canal, Bureau of Reclamation, Denver, Spec. 1816, bids to June 11.

600 Tons, Rockford, Ill., power station for Central Illinois Electric & Gas Co., Stone & Webster Engineering Corp., Boston engineers.

550 Tons, State of Wyoming, tunnel project. Bid 40-N-734 Y.

350 Tons, Urbana, Ill., fine arts building, University of Illinois.

350 Tons, Philadelphia, Pennsylvania Sugar Co., warehouse No. 5, bids in.

270 Tons, Clearfield County, Pa., Pennsylvania Dept. of Highways, bridge, to be rebid on May 23.

205 Tons, Kelso, Wash., bridge over Columbia & Cowlitz Railway, Director of Highways, Olympia, bids to May 20.

200 Tons, Chicago, building for E. E. Mills Corp.

200 Tons, Dubuque, Iowa, power station.

160 Tons, Wisconsin, five storage tanks capacity 18,000 gal.

160 Tons, Cobbs Creek, Pa., City of Philadelphia, bridge over Church Lane, May 26.

145 Tons, Honolulu, T. H., highway along Hamakua Coast on Island of Hawaii, Territorial Highway Engineer, Honolulu, bids to June 9.

140 Tons, Jefferson County, Wis., highway bridge FAS9442 has been abandoned.

• • • **Reinforcing bar awards** this week included the following:

670 Tons, State of Iowa, highway construction, Booth & Olson Inc., Sioux City, Iowa, low bidder.

360 Tons, South San Francisco, bridges and substructures, Bayshore Freeway, through H. J. Oser and P. Sorenson, to Bethlehem Pacific Coast Steel Corp., San Francisco.

320 Tons, Carter, Ark., Bull Shoals Constructors, Carter, Ark.

140 Tons, Modesto, Calif., bridge across Stanislaus River, through Fredrickson and Watson, to San Jose Steel Co.

• • • **Reinforcing bar inquiries** this week included the following.

11,000 Tons, Bloomington, Ind., apartment dormitory for men's student group, University of Indiana.

1755 Tons, Los Angeles, four-level separation at Hollywood Parkway and Arroyo Seco-Harbor Parkway, California Div. of Highways, Los Angeles, bids to June 12.

950 Tons, Omaha, Neb., sewer project.

780 Tons, Coulee City, Wash., Bureau of Reclamation, Denver, Inv. G-38,358-A, bids to May 19.

750 Tons, Chicago, Addison St. sewer project.

250 Tons, Oakland, Calif., overcrossing over East Shore Freeway at 23rd Ave., California Div. of Highways, Sacramento, bids to June 4.

200 Tons, South Boston, bakery for Bakeries, Inc.

195 Tons, San Luis Obispo, Calif., paving between San Luis Obispo and Guesta Grade, California Div. of Highways, Sacramento, bids to June 4.

110 Tons, Klamath County, Ore., three bridges over Sprague River, State Highway Commission, Portland.

• • • **Sheet piling awards** this week included the following:

400 Tons, South San Francisco, bridges and substructures, Bayshore Freeway, through H. J. Oser and P. Sorenson, to Columbia Steel Co., San Francisco.

• • • **Plate inquiries** this week included the following:

500 Tons, Somerville, Mass., 30 in. and 36 in. pipe for Metropolitan District Commission.

Jessop and Alan Wood Unite on Stainless-Clad

Washington, Pa.

• • • **The Jessop Steel Co.,** Washington, Pa., and the Alan Wood Steel Co., Conshohocken, Pa., have completed a working agreement whereby the technical and manufacturing facilities of both companies are to be used for large tonnage production of stainless-clad steel sheets, according to an announcement by officials of both companies.

Jessop is a producer of stainless and stainless-clad steel, as well as tool and alloy steels, and other specialties, while Alan Wood has been producing openhearth steels for 120 years. The agreement between the two steel companies is expected to contribute greatly to meeting the current demand for stainless-clad steel sheet in the food processing and architectural industries, and the anticipated demand for this material in new fields, particularly for automobile accessories such as stainless-clad bumpers, and home appliances.

MACHINE TOOLS

. . . News and Market Activities

Reports Indicate Falling Off in Machine Tool Market in April

• • • **A preview of the** machine tool industry's statistical showing in April, based on preliminary reports, indicates shipments of about $25,200,000, new firm orders totaling about $18,500,000, cancellations amounting to about $1,500,000 and unfilled orders of $128 million.

Estimates of the industry's April performance compare with March totals as follows: March shipments were $26,400,000, new firm orders $19,500,000, cancellations $1,400,000 and unfilled orders $137,000,000. In other words, April new firm orders are down about 7 pct, shipments down about 5 pct, cancellations are very slightly higher, and the backlog is falling off pretty fast.

Despite their preliminary nature, these estimates are pretty well backed up by on-the-spot reports from machine tool centers across the nation. The machine tool business is flattening out, and with shipments continuing to exceed new firm orders, some observers believe that the machine tool business will be at very low ebb in the next few months.

In Detroit, the process of whittling down the machine tool order backlogs goes on relentlessly. Builders of highly specialized labor-saving types of equipment continue to operate at or near capacity. Perishable tool volume, while satisfactory, is reported to be falling off noticeably. Foreign business is still an important factor so far as many producers are concerned.

There is the hope that the machine tool industry in this area may soon receive a shot-in-the-arm as a result of new model activities. One independent producer is reported to have practically completed its tooling for 1948 models and there are indications that other producers are giving increased attention to new models.

Most sources here believe that at least one major producer will start stamping of parts for 1948 models as early as September. Some observers have suggested

New Firm Orders and Shipments Are Down While Backlogs Are Dropping Rapidly

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that the current shortages of steel will tend to encourage rather than retard the introduction of new models, since necessary shutdown periods could then be used to build adequate steel supplies before starting new model runs.

A spokesman for General Motors Corp. has announced that the proposed Cleveland-Chevrolet light car project has been indefinitely deferred because of the continuing shortage of materials both for new building construction and auto production. This announcement follows reports by several machine tool builders that inquiries have recently been received from the light car division for additional information on machine tool orders which have been held up for many months pending a final GM decision on the proposed light car project. No outright cancellations of equipment for the proposed car have been reported.

Deliveries of machine tools, while somewhat improved over six months or a year ago, are reported to be somewhat disappointing by several dealers. Electrical supplies seem to be easier, but reports indicate that an improvement in deliveries of machines on order would be particularly welcomed by dealers who are being hard pressed for deliveries of new equipment scheduled for use on 1948 models.

Several Detroit dealers have expressed dissatisfaction with their ability to process orders through WAA and according to some sources, this condition is growing worse rather than improving in this area. A number of dealers have already withdrawn from WAA selling; others are reported to be considering a similar move. Abuse of the privilege of educational institutions to buy machine tools at greatly reduced prices has been reported by several sources.

In Chicago, new inquiries on machine tools are reported as spotty by manufacturers in the area. They report there is still a fair demand for gear generators and hobbing machines, but that much of the general purpose equipment business is going to WAA. Surplus machines, which have been cheap by ordinary standards, are now proportionately much lower, due to the recent increases in some lines of new machine tools.

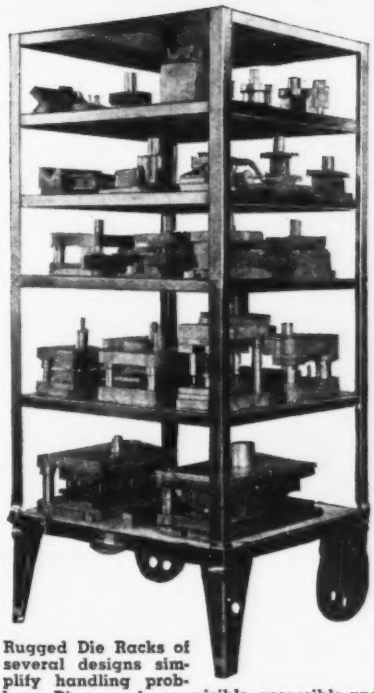
Some Chicago manufacturers report that their biggest bottleneck at the moment is in obtaining motors. The electric companies are quoting as high as 65 to 85-week delivery on the smaller motors and some of the machine tool makers are having difficulty obtaining controls. The casting situation is still tight, but appeared to be somewhat better in the last 30 days. Much of the time, thought and effort at the moment is being expended in preparation for the Machine Tool Show. Manufacturers are all looking forward to the show as a source of substantial new firm orders when the users get a look at the new machines.

In Cincinnati, machine tool builders are struggling to retain what men they have on their payrolls and little, if any, new business is on the books. The large majority of builders are contracting outside work, in an effort to keep their men and machines occupied, and even this contracting work is becoming harder to find with most plants catching up on their backlogs and anxious to keep production expense to a minimum.

All of the plants here have cut manpower down considerably since the war, but are still employing larger numbers than before the war.

In trade circles here, the slump is attributed to the lack of interest on the buyer's part until after the new developments presented at the show in the fall. Predictions generally are a little more favorable for late fall and winter, but the summer holds no promise of a brighter situation.

The hand Jimmy quickly moves Transports loaded with other units.



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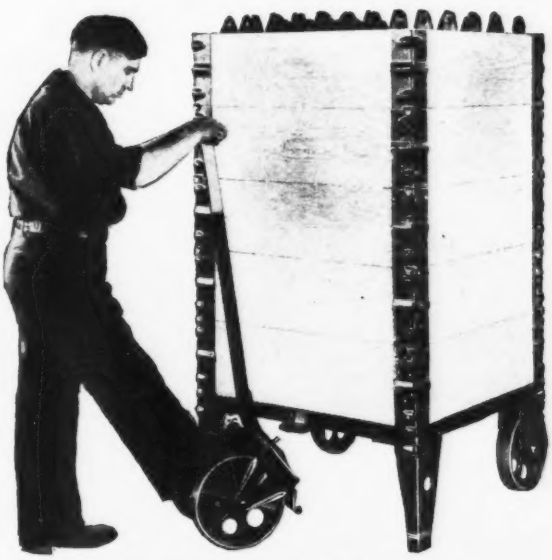

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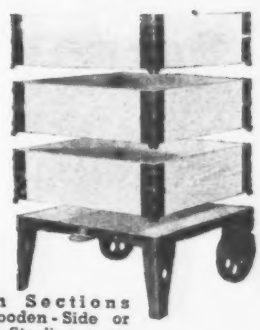

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NONFERROUS METALS

. . . News and Market Activities

Copper

• • • **The domestic** copper market is still on a multiple price basis as described last week. Copper producers report that they are unable to meet all requirements from domestic production plus a limited tonnage of imported copper sold at the higher price. Wire and cable mills are reported to be taking as much copper as they can obtain even at the high price. Conflicting reports are made as to the position of the brass mills in regard to the acceptance of foreign copper. It is reported from one quarter that three to four of the very large consumers are not taking copper as they are interested in cutting down their inventories which is made possible by the June vacation shutdown. Other mills are reported to be continuing to seek supplies. No brass mill has yet announced price increases in its products, even though the production of one mill is reported to be partially from imported copper.

•

Zinc

• • • **Regular High Grade** zinc is the only grade in plentiful supply according to producers. Special High Grade and Prime Western continue to be limited to consumers. The Premium Price Plan comes to an end on June 30 and it is expected that some of the smaller producers who have been getting as much as 5½¢ subsidy might be forced to close down at that time unless the new subsidy bill now under congressional consideration goes through and affords them relief. In that eventuality there is a possibility that the price might go up. Large producers are against the subsidy measure, believing that the nonferrous minerals industry should be able to stand on its own without subsidy.

•

Aluminum

• • • **The delivery** situation on aluminum fabricated products continues to improve. Major producers report the following backlogs: Extrusions and tubing, 6 weeks; wire rod and bar, 6 weeks; sheet, July. Aluminum foil deliveries are much earlier than recently. Aluminum cable-steel reinforced deliveries are bad because of the slow deliveries of steel wire products.

•

Lead

• • • **The lead supply** position is still tight but producers anticipate that high production from March to May, coupled with vacation shutdowns among fabricators in June, may serve to equalize it with demand so that all essential applications may be taken care of. By that time producers are anticipating a decline in metal requirements that may permit it to continue in balance with demand. Production in the Far West could probably be further increased but the labor supply is inadequate to step up production. The MR lead stockpile was reported at 25,000 tons on May 1. The government is distributing lead at the rate of about 5000 tons per month.

•

Tungsten

• • • **After three** recent price increases in ferrotungsten and the possibility of additional increases unless the Chinese are able to start shipping ore—not likely in view of the civil war and inflation rampant in that country—steelmakers are reported to be analyzing the competitive advantages of molybdenum alloyed tool steels.

•

Antimony

• • • **This metal,** one of the few materials now under allocation, is in better supply-demand relationship than before the price rise in mid-March. The principal domestic producer, National Lead Co., has reported that while the supply of antimony is still tight, it is possible to meet practically all requirements. In a few instances it has been necessary to refer inquiries to the government stockpile. There is still a small reserve of MR antimony in metal form. It is understood that ore formerly held by the government has been converted into metal. There have been no imports of metal from China since the war as the inflated economy there and our 2¢ duty make it impractical. Some ore has come in recently from Bolivia and Siam.

•

No Buying of Scrap Metal

New York

• • • **For the second week** the scrap metals market continued inactive as practically no buying was being done in any field. Prices quoted remain the same as last week but these are nominal in the absence of transactions to establish the market. This trend is true of all metals, both red and white. Under the circumstances it is the impression of some members of the trade that the trend of scrap prices must be downward even though the price of primary copper may be expected to rise soon.

•

Scrap Stocks Decline

Ottawa

• • • **While Canadian** dealers' stocks of brass and bronze scrap increased slightly in February, aluminum scrap, copper scrap and tin-lead scrap stocks declined.

Nonferrous Metals Prices

Cents per pound

	May 14	May 15	May 16	May 17	May 19	May 20
Copper, electro, Conn.	21.50—24.00	21.50—24.00	21.50—24.00	21.50—24.00	21.50—24.00	21.50—24.00
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	80.00	80.00	80.00	....	80.00	80.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb)	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	33.00
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be	$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be	$27.50
Cadmium, del'd	$1.75
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. Valley	21.50 to 24.00
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$85 to $95
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%	20.50
Magnesium, sticks, carlots	36.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$85.00 to $87.00
Nickel, electro, f.o.b. New York	37.67
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$59 to $62
Silver, New York, cents per oz.	72.75
Tin, Straits, New York	80.00
Zinc, East St. Louis	10.50
Zinc, New York	11.005
Zirconium copper, 6 pct Zr, per lb contained Zr	$8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	20.50
No. 120	20.00
No. 123	19.50
80-10-10 ingot	
No. 305	24.50
No. 315	22.75
88-10-2 ingot	
No. 210	28.25
No. 215	27.25
No. 245	22.75
Yellow ingot	
No. 405	16.25
Manganese Bronze	
No. 421	18.50

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	17.00
0.60 copper, max.	16.25-16.75
Piston alloys (No. 122 type)	15.00-15.25
No. 12 alum. (No. 2 grade)	14.50
108 alloy	14.75
195 alloy	15.25-15.50
AXS-679	14.75
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1—95 pct-97½ pct	15.50
Grade 2—92 pct-95 pct	14.50
Grade 3—90 pct-92 pct	13.75
Grade 4—85 pct-90 pct	13.25

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	36⅞
Electrodeposited	**31¾**
Rolled, oval, straight, delivered	32⅛
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	33
Zinc, Cast, 99.99	18¾
Nickel, 99 pct plus, frt allowed	
Cast	51
Rolled, depolarized	52
Silver, 999 fine	
Rolled, 1000 oz lots, per oz.	88¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	40.50
Copper sulphate, 99.5, crystals, bbls	11.50
Nickel salts, single, 425 lb bbls, frt allowed	14.50
Silver cyanide, 100 oz. lots, per oz	70¾
Sodium cyanide, 96 pct, domestic, 200 lb drums	15.00
Zinc cyanide, 100 lb drums	34.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed	7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 52S, 24.2¢ 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base. B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16; 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb. f.o.b. mill. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75.

Round Rod: M, diam, in., ¼ to ⅜, 47¢; ½ to ¾, 45¢; 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢ 38 to 40, 75.5¢ 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.21; 5/16 to ¾, $1.12; ⅜ to 7/16, 97¢; 0.058 to 0.064, 7/16 to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢ 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.	15.50
Ribbon, ton lots	14.50
Plates	
Small	**13.50**
Large, over 12 in.	**14.50**

Copper, Brass, Bronze

(Cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	32.78	....	32.93
Copper, hot rolled	....	29.28	....
Copper, drawn	....	30.28	....
Low brass	39.13	30.32	30.63
High brass	32.30	29.58	29.89
Red brass	39.74	30.93	31.24
Naval brass	28.73	27.48	33.42
Brass, free cutting	27.23	23.64	....
Commercial bronze	40.86	32.05	32.36
Manganese bronze	32.28	30.78	36.92
Phosphor bronze, 5 pct.	....	50.98	50.75
Muntz metal	28.42	27.17	31.61
Everdur, Herculoy Olympic, etc	36.30	34.80	37.71
Nickel silver, 5 pct.	40.54	39.53	37.92
Architectural bronze	27.23	....	....

Scrap Metals

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Brass Mill Scrap

(Lots of less than 15,000 lb.)

Cartridge brass turnings	14¼
Loose yellow brass trimmings	15⅛

Copper and Brass

No. 1 heavy copper and wire	16½—17
No. 2 heavy copper and wire	15½—16
Light copper	14½—15
Auto radiators (unsweated)	10 —10½
No. 1 composition	13 —13½
No. 1 composition turnings	12½—13
Clean red car boxes	12 —12½
Cocks and faucets	10½—11
Mixed heavy yellow brass	8½— 9
Old rolled brass	8½— 9
Brass pipe	9½—10
New soft brass clippings	12½—13
Brass rod ends	11½—12
No. 1 brass rod turnings	11 —11½

Aluminum

Alum. pistons free of struts	5½— 6
Aluminum crankcases	5½— 6
2S aluminum clippings	7 — 7½
Old sheet & utensils	6 — 6½
Mixed borings and turnings	2 — 2¼
Misc. cast aluminum	5½— 6
Dural clips (24S)	5⅛— 6

Zinc

New zinc clippings	7½— 8
Old zinc	5½— 6
Zinc routings	2½— 2¾
Old die cast scrap	3½— 4

Nickel and Monel

Pure nickel clippings	19½—20½
Clean nickel turnings	16½—17½
Nickel anodes	**19½—20½**
Nickel rod ends	19 —20
New Monel clippings	13 —14
Clean Monel turnings	**9 —10**
Old sheet Monel	11 —12
Old Monel castings	**10 —11**
Inconel clippings	10 —11
German silver clippings, mixed	9½—10½
German silver turnings, mixed	7 — 7½

Lead

Soft scrap lead	12½—13
Battery plates (dry)	7½— 7¾

Miscellaneous

Block tin	67 —68
No. 1 pewter	50 —52
No. 1 auto babbitt	40 —43
Mixed common babbitt	13½—14
Solder joints	15½—16
Siphon tops	40 —42
Small foundry type	15½—16
Monotype	13¼—13¾
Lino and stereotype	12¾—13¼
Electrotype	10¾—11¼
New type shell cuttings	10½—11
Clean hand picked type shells	**5½— 6**
Lino and stereo dross	5½— 6
Electro dross	3¼— 3½

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect. Freight equalized with nearest free delivery point.

Full lead sheets	18.25
Cut lead sheets	18.75
Lead pipe, manufacturing point	17.50
Lead traps and bends	List +42%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules	List +42%
Lead wool	19.50

SCRAP

. . . News and Market Activities

Business Is Slow With Few Price Changes

New York

• • • Price changes were fewer and smaller this week than they have been at any time since the end of OPA control. There is talk in the selling end of the trade of some firmness but it has not been reflected in any heavy steel price increases except for Detroit, where No. 1 steel is up $1. Low phos was a bit higher in Chicago and Detroit; and turnings were firmer in Cleveland. Some railroad grades were up in Pittsburgh, Philadelphia, and Cleveland. Heavy melting grades were lower at Philadelphia and the spread between No. 1 and No. 2 grades increased there.

There was a noticeable absence of large purchases during the week and business was at a reduced volume in almost all major markets. Observers laid the bullishness of scrap sellers to the fact that most old and higher priced orders have just about been cleaned up; mill stocks are generally reported to be comfortable but not big enough to support current high melting rates for any extended period.

•

PITTSBURGH—Evidences of a firmer market in scrap were prevalent this week, even though there are no known mill purchases at higher than the $29.50 to $30 a ton range. Brokers are having considerable difficulty covering orders taken at these prices and some state that it's hard to cover for the $32.50 orders previously accepted. The low phos market is pretty widespread, depending upon the material shipped. Dealer low phos is selling from $35 to $37 a ton while good industrial low phos is moving in the $39 to $40 range. Low phos heavy melting scrap, a grade evolved after the close of the war, is moving in the $37 to $38 range. This grade is nothing more than No. 1 heavy melting scrap cut to electric furnace size. There is no cast market, foundries being apparently filled up. The price of No. 1 cupola cast ranges from $37 to $38 a ton, down from last week's $39 to $40 a ton. Crushers are buying machine shop turnings for about $26.50 a ton, which means close to a $30 a ton market for short turnings. Shippers report that rejections are running pretty high, particularly on the higher priced orders that are being filled.

•

CHICAGO—Market conditions remained relatively unchanged last week. New purchases were small and shipments continued heavy. Consumers are constantly getting tougher on grading. Generally, the trade expressed the opinion that the heavy melting market was firm at the last price but conflicting opinions were expressed concerning what will happen when all the large buyers again start placing real tonnage. No new railroad lists of any size were sold last week. Low phos plates showed a wider spread in price than any other single item depending on end use.

•

PHILADELPHIA — Heavy melting grade prices declined last week but there was a definite feeling of firmness in the market. Prices of railroad specialties have increased in line with current awards. Dealers are no longer exerting pressure to sell. Mills continue placing small tonnage orders. Dealers are reported still unwilling to cut up low phos because of high labor costs. The decline of railroad malleable reported last week was not representative and current sales establish a price of $50 to $52. Local yards are reported to contain little scrap tonnage.

•

NEW YORK—Last week saw the end of some old orders permitting brokers to pay $25 for No. 1 steel but a few remained, and steel scrap prices are unchanged. While most Pittsburgh orders have been filled, some remain. Early in the week no large orders were around to tip the market one way or the other but cast grades were weaker.

•

DETROIT — Scrap prices are firmer again this week with good prospects for scrap costs going still higher according to trade sources. While no precise estimate can be made as to the effect of recent auto plant closings, it has been estimated that a minimum of 150 tons of scrap per day is being lost as a result of shutdowns of auto plans plants waiting for steel deliveries to catch up with their production schedules. The market for low phos plate continues strong and the consensus is that the present efforts to bring the Detroit market into balance with prices in other cities will be continued. A compensating factor in the present situation is that supplies of country scrap being delivered and on hand in the unprepared condition in dealers yards continue to climb.

•

CLEVELAND—Shipments are slowing down in a declining scrap market here, and in the Valley. While there is much activity to complete the old, higher priced orders, a little time will be required to build up shipments to high levels of recent weeks. Dealer scrap has been cleared up pretty well, and while the market is not weak, it is definitely quiet and sensitive, and as long as operations continue at the present high level it will bear watching.

•

BOSTON—What little activity is visible centers largely in cast, but as supply is small deliveries are confined to trucklots. Big cast users still have 2 or 3 weeks' supply on hand and in one case more. Small foundries take all they can get at $45 a ton up to $50, with $45 predominating. Some bundling material is moving. Quotations on heavy steel are largely nominal.

•

BUFFALO — Scrap steel prices held their ground the past week in the absence of disturbing developments. New business was at a minimum and no important buying was anticipated before the end of the month, when a number of outstanding contracts will expire. Increased consumption of openhearth material for the next 60 to 90 days was indicated by the removal from service of a steel mill blast furnace for repairs. One of the leading local foundries having its own blast furnace has refused to pay more than the price of pig iron for cast scrap or about $34, while another big melter has offered $37 for No. 1 cupola.

•

CINCINNATI—The market here remains quiet this week, with two large interests out of the picture entirely. Other consumers in the area have fair inventory of scrap and are buying only slowly. Prices are down a fraction in some grades.

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ST. LOUIS—In a comparatively quiet market No. 1 steel slipped off 75¢; No. 2 dipped 25¢. Machine shop turnings were a little stronger. Several of the railroad cast grades were off an average of $3. The local steel melt is well below capacity, adding to the dullness here.

•

BIRMINGHAM—For the second successive week, scrap prices in this market show no change. Buying is limited with only small tonnages moving on a delivery in May basis. Mills and foundries in this district have good inventories at present.

•

TORONTO—Dealers say receipts have improved slightly, but offerings are far below the prewar average and fall far short of meeting consumer requirements. Large consumers have arranged to import large tonnages of war scrap from Europe and it is expected that imports, exclusive of the United States, may enable mills to get through this year without any drastic cut in steel production due to scrap shortage.

WAA Orders Scrap Drive

Washington

• • • Local committees to cooperate with the 32 WAA regional offices have been appointed by chairman Robert W. Wolcott of the Steel Foundry & Scrap Industries Committee to expedite scrap disposal.

WAA Administrator Robert M. Littlejohn has directed cooperation with these committees to sell quickly all WAA iron and steel scrap. All WAA officials are to report at once any obstacles handicapping prompt scrap disposal.

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$29.50 to $30.00
RR. hvy. melting	33.75 to 34.25
No. 2 hvy. melting	29.50 to 30.00
RR. scrap rails	38.00 to 39.00
Rails 2 ft. and under	42.00 to 42.50
No. 1 comp'd bundles	29.50 to 30.00
Hand bdld. new shts.	29.50 to 30.00
Hvy. axle turn	29.00 to 29.50
Hvy. steel forge turn	29.00 to 29.50
Mach. shop turn	26.00 to 27.00
Short shov. turn	28.50 to 29.00
Mixed bor. and turn	27.00 to 28.00
Cast iron borings	27.00 to 28.00
No. 1 cupola cast	37.00 to 38.00
Heavy breakable cast	30.00 to 30.50
Malleable	44.00 to 45.00
RR. knuck and coup	40.00 to 41.00
RR. coil springs	40.00 to 41.00
Rail leaf springs	40.00 to 41.00
Rolled steel wheels	40.00 to 41.00
Low phos	37.50 to 38.50

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$29.00 to $29.50
No. 2 hvy. melting	28.00 to 28.50
No. 1 bundles	29.00 to 29.50
No. 2 dealers' bundles	28.00 to 28.50
Bundled mach. shop turn.	28.00 to 28.50
Galv. bundles	26.00 to 26.50
Mach. shop turn.	23.00 to 23.50
Short shov. turn.	25.00 to 25.50
Cast iron borings	24.00 to 24.50
Mix. borings & turn.	23.00 to 23.50
Low phos. hvy. forge	34.50 to 35.50
Low phos. plates	32.00 to 34.00
No. 1 RR. hvy. melt	29.50 to 30.00
Rerolling rails	34.50 to 35.00
Miscellaneous rails	32.00 to 33.00
Angles & splice bars	35.50 to 36.00
Locomotive tires, cut	38.00 to 38.50
Cut bolster & side frames	35.50 to 36.00
Standard stl. car axles	38.00 to 38.50
No. 3 steel wheels	35.00 to 35.50
Couplers & knuckles	36.00 to 36.50
Malleable	47.00 to 49.00
No. 1 mach. cast	37.00 to 37.50
Rails 2 ft. and under	36.00 to 37.00
No. 1 agricul. cast	36.00 to 36.50
Hvy breakable cast	34.00 to 34.50
RR. grate bars	32.00 to 32.50
Cast iron brake shoes	36.00 to 36.50
Cast iron carwheels	34.50 to 35.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 bundles	25.00 to 26.00
No. 2 bundles	25.00 to 26.00
Mach. shop turn	19.00 to 20.00
Shoveling turn.	20.00 to 21.00
Cast iron borings	19.00 to 20.00
Mixed bor. & turn.	19.00 to 20.00
Low phos. plate	36.00 to 37.00
No 1 cupola cast	42.00 to 44.00
Hvy. breakable cast	33.00 to 34.00
Scrap rails	38.00 to 39.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$22.00 to $23.00
No. 2 hvy. melting	22.00 to 23.00
Nos. 1 and 2 bundles	22.00 to 23.00
Busheling	20.00 to 21.00
Turnings, shovelings	19.00 to 19.50
Machine shop turn.	17.00 to 17.50
Mixed bor. & turn.	17.00 to 17.50
Cl'n cast. chem. bor.	22.00 to 24.50
No. 1 machinery cast	.... 45.00
No. 2 machinery cast	.... 45.00
Heavy breakable cast	.... 45.00
Stove plate	.... 45.00

DETROIT

Per gross, ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$25.75 to $26.25
No. 2 hvy. melting	25.75 to 26.25
No. 1 bundles	25.75 to 26.25
New busheling	25.75 to 26.25
Flashings	25.75 to 26.25
Mach. shop turn	21.50 to 22.00
Short shov. turn	22.50 to 23.00
Cast iron borings	22.50 to 23.00
Mixed bor. & turn	22.50 to 23.00
Low phos. plate	30.00 to 31.00
No. 1 cupola cast	33.00 to 35.00
Hvy. breakable cast	26.00 to 28.00
Stove plate	30.00 to 32.00
Automotive cast	33.00 to 35.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 bundles	29.00 to 30.00
No. 2 bundles	25.00 to 26.00
Mach. shop turn.	22.00 to 23.00
Shoveling turn.	22.50 to 23.00
Mixed bor. & turn.	20.00 to 21.00
Clean cast chemical bor.	29.00 to 30.00
No. 1 cupola cast.	40.00 to 42.00
Hvy. breakable cast	36.00 to 38.00
Cast. charging box	38.00 to 39.00
Clean auto cast	40.00 to 42.00
Hvy. axle forge turn.	29.00 to 30.00
Low phos. plate	32.00 to 33.00
Low phos. punchings	32.00 to 33.00
Low phos. bundles	30.00 to 31.00
RR. steel wheels	37.00 to 37.50
RR. coil springs	37.00 to 37.50
RR. malleable	50.00 to 52.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	26.50 to 27.50
Bundled sheets	26.50 to 27.00
Mach. shop turn.	20.00 to 21.00
Locomotive tires, uncut	33.00 to 34.00
Mis. std. sec. rails	30.00 to 32.00
Rerolling rails	32.00 to 33.00
Steel angle bars	35.00 to 36.00
Rails 3 ft. and under	37.00 to 38.00
RR. steel springs	34.00 to 36.00
Steel car axles	36.00 to 37.00
Stove plate	31.00 to 32.00
Grate bars	31.00 to 32.00
Brake shoes	32.00 to 33.00
Malleable	47.00 to 49.00
Cast iron car wheels	41.00 to 42.00
No. 1 machinery cast.	36.00 to 37.00
Breakable cast	29.00 to 30.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	.... $27.00
No. 2 hvy. melting	.... 27.00
No. 2 bundles	.... 27.00
No. 1 busheling	.... 27.00
Long turnings	.... 22.00
Shoveling turnings	.... 24.00
Cast iron borings	.... 23.00
Bar crops and plate	$29.00 to 30.00
Structural and plate	29.00 to 30.00
No. 1 cast	36.00 to 37.00
Stove plate	34.00 to 35.00
No. 1 RR hvy. melt	.... 28.00
Steel axles	30.00 to 31.00
Scrap rails	30.00 to 31.00
Rerolling rails	32.00 to 33.00
Angles & splice bars	29.00 to 30.00
Rails 3 ft. & under	29.00 to 30.00
Cast iron carwheels	30.00 to 31.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$30.50 to $31.50
No. 2 hvy. melting	30.50 to 31.50
Low phos. plate	35.50 to 36.00
Mach. shop turn.	26.50 to 27.00
Short shov. turn.	27.50 to 28.00
Cast iron borings	27.50 to 28.00
Elec. furnace punch	35.50 to 36.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$24.00 to $25.00
No. 2 hvy. melting	23.00 to 25.00
No. 2 bundles	23.00 to 25.00
Comp. galv. bundles	21.00 to 23.00
Mach. shop turn	17.50 to 18.75
Mixed bor. & turn	17.50 to 18.75
Shoveling turn.	18.50 to 20.75
No. 1 cupola cast	33.00 to 34.00
Hvy. breakable cast	30.00 to 31.00
Charging box cast	31.00 to 32.00
Stove plate	31.00 to 32.00
Clean auto cast	33.00 to 34.00
Unstrip. motor blks.	29.00 to 30.00
Cl'n chem. cast bor.	22.50 to 23.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 bundles	29.00 to 30.00
No. 2 bundles	29.00 to 30.00
No. 1 busheling	29.00 to 30.00
Mach. shop turn	21.00 to 22.00
Shoveling turn.	23.00 to 24.00
Cast iron borings	21.00 to 22.00
Mixed bor. & turn.	21.00 to 22.00
No. 1 cupola cast	35.00 to 38.00
Charging box cast	29.00 to 30.00
Stove plate	30.00 to 35.00
Clean auto cast	35.00 to 38.00
Malleable	39.00 to 41.00
Low phos. plate	32.00 to 34.00
Scrap rails	32.00 to 35.00
Rails 3 ft. & under	37.00 to 38.00
RR. steel wheels	37.00 to 38.00
Cast iron carwheels	37.00 to 38.00
RR. coil & leaf spgs.	37.00 to 38.00
RR. knuckles & coup.	37.00 to 38.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$29.50 to $31.00
No. 2 hvy. melting	29.50 to 31.00
Compressed sheet stl.	29.50 to 31.00
Drop forge flashings	29.50 to 31.00
No. 2 bundles	29.50 to 31.00
Mach. shop turn.	26.00 to 26.50
Short shovel.	27.00 to 27.50
No. 1 busheling	29.50 to 31.00
Steel axle turn.	29.50 to 31.00
Cast Iron borings	27.00 to 27.50
Mixed bor. & turn.	27.00 to 27.50
No. 1 machinery cast	40.00 to 42.00
Malleable	50.00 to 55.00
RR. cast	40.00 to 41.00
Railroad grate bars	37.00 to 38.00
Stove plate	37.00 to 38.00
RR. hvy. melting	32.00 to 32.50
Rails 3 ft. & under	41.50 to 42.00
Rails 18 in. & under	42.50 to 43.00
Elec. furnace punch.	33.00 to 33.50

SAN FRANCISCO

Per gross ton delivered to consumer:

No. 1 hvy. melting	.... $19.50
No. 2 hvy. melting	.... 19.50
No. 2 bales	.... 19.50
No. 3 bales	.... 16.00
Mach. shop turn.	.... 13.00
Elec. furn. 1 ft. und.	.... 25.00
No. 1 cupola cast	$32.00 to 33.00
RR. hvy. melting	.... 20.50

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	.... $19.50
No. 2 hvy. melting	.... 19.50
No. 1 bales	.... 19.50
No. 2 bales	.... 19.50
No. 3 bales	.... 16.00
Mach. shop turn.	.... 14.50
No. 1 cupola cast	$35.00 to 36.00
RR. hvy. melting	.... 20.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	$20.00 to $21.00
Elec. furn. 1 ft. und.	23.00 to 25.00
No. 1 cupola cast	26.00 to 27.00
RR. hvy. melting	21.00 to 22.00

HAMILTON, ONT.

Per gross ton delivered to consumer:

Cast grades f.o.b. shipping point

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	26.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

* Ceiling price

Comparison of Prices . .

Advances over past week in **Heavy Type**, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	May 20, 1947	May 13, 1947	Apr. 22, 1947	May 21, 1946
Hot-rolled sheets	2.50	2.50	2.50	2.425
Cold-rolled sheets	3.20	3.20	3.20	3.275
Galvanized sheets (10 ga.)	3.55	3.55	3.55	4.05*
Hot-rolled strip	2.50	2.50	2.50	2.35
Cold-rolled strip	3.20	3.20	3.20	3.05
Plates	2.65	2.65	2.65	2.50
Plates, wrought iron	5.95	5.95	5.95	4.112
Stain's c-r strip (No. 302)	30.30	30.30	30.30	30.30
*24 ga				
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.75	$5.75	$5.75	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	5.05	4.50
Special coated mfg. ternes	4.90	4.90	4.90	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.60	2.60	2.60	2.50
Cold-finished bars	3.20	3.20	3.20	3.10
Alloy bars	3.05	3.05	3.05	2.92
Structural shapes	2.50	2.50	2.50	2.35
Stainless bars (No. 302)	26.00	26.00	26.00	24.00
Wrought iron bars	6.15	6.15	6.15	4.76
Wire and Wire Products: (cents per pound)				
Bright wire	3.30	3.30	3.30	3.05
Wire nails	3.75	3.75	3.75	3.25
Rails: (dollars per 100 lb)				
Heavy rails	$2.50	$2.50	$2.50	$43.39*
Light rails	2.85	2.85	2.85	49.18*
*per net ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$42.00	$42.00	$42.00	$39.00
Sheet bars	50.00	50.00	50.00	38.00
Slabs, rerolling	42.00	42.00	42.00	39.00
Forging billets	50.00	50.00	50.00	47.00
Alloy blooms, billets, slabs	61.00	61.00	61.00	58.43
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.55	2.55	2.55	2.30
Skelp	2.35	2.35	2.35	2.05

Pig Iron: (per gross ton)	May 20, 1947	May 13, 1947	Apr. 22, 1947	May 21, 1946
No. 2, foundry, Phila.	$36.51	$36.51	$36.51	$28.34
No. 2, Valley furnace	33.50	33.50	33.50	26.50
No. 2, Southern, Cin'ti	34.75	34.75	34.75	26.94
No. 2, Birmingham	29.88	29.88	29.88	22.88
No. 2, foundry, Chicago†	33.00	33.00	33.00	26.50
Basic, del'd eastern Pa.	36.92	36.92	36.92	27.84
Basic, Valley furnace	33.00	33.00	33.00	26.00
Malleable, Chicago†	33.50	33.50	33.50	26.50
Malleable, Valley	33.50	33.50	33.50	26.50
Charcoal, Chicago	45.99	45.99	45.99	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$29.75	$29.75	$32.25	$20.00
Heavy melt'g steel, Phila.	*29.50*	29.75	30.50	18.75
Heavy melt'g steel, Ch'go	29.25	29.25	32.75	18.75
No. 1, hy. comp. sheet, Det.	26.00	25.00	29.75	17.32
Low phos. plate, Youngs'n	35.75	35.75	38.25	22.50
No. 1, cast, Pittsburgh	*37.50*	39.50	44.75	20.00
No. 1, cast, Philadelphia	41.00	41.00	45.50	20.00
No. 1, cast, Chicago	37.25	37.25	40.50	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$10.50	$10.50	$10.50	$7.50
Foundry coke, prompt	11.25	11.25	11.25	9.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	23.00	23.00	21.50	12.00
Copper, Lake, Conn.	21.625	21.625	21.625	12.00
Tin, Straits, New York	80.00	80.00	80.00	52.00
Zinc, East St. Louis	10.50	10.50	10.50	8.25
Lead, St. Louis	14.80	14.80	14.80	6.35
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67	37.67	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when the actual data of shipments for this quarter are compiled.

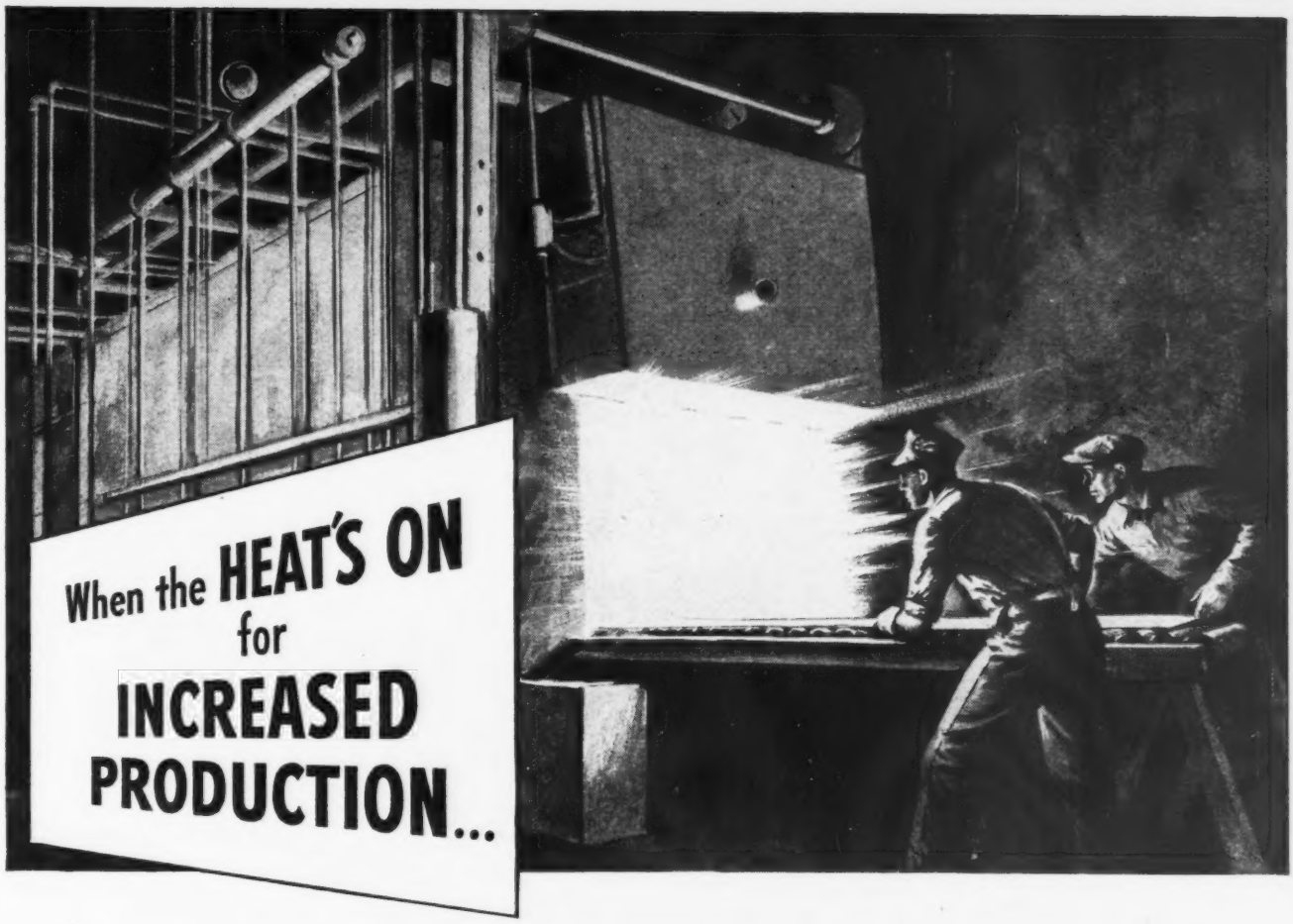
	FINISHED STEEL	PIG IRON	SCRAP STEEL
May 20, 1947	2.85664¢ per lb.	$33.15 per gross ton	*$29.50* per gross ton
One week ago	2.85664¢ per lb.	$33.15 per gross ton	$29.58 per gross ton
One month ago	2.85664¢ per lb.	$33.15 per gross ton	$31.83 per gross ton
One year ago	2.73011¢ per lb.	$26.12 per gross ton	$19.17 per gross ton

	HIGH		LOW		HIGH	LOW	HIGH	LOW
1947	2.85664¢		2.85664¢		$33.15 Mar. 11	$30.14 Jan. 7	$39.67 Mar. 18	$29.50 May 20
1946	2.83599¢	Dec. 31	2.54490¢	Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢	Oct. 2	2.38444¢	Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢	Sept. 5	2.21189¢	Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢		2.29176¢		23.61	23.61	$19.17	$19.17
1942	2.28249¢		2.28249¢		23.61	23.61	19.17	19.17
1941	2.43078¢		2.43078¢		$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢	Jan. 2	2.24107¢	Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢	Jan. 3	2.26689¢	May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢	Jan. 4	2.27207¢	Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢	Mar. 9	2.32263¢	Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢	Dec. 28	2.05200¢	Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢	Oct. 1	2.06492¢	Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢	Apr. 24	1.95757¢	Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢	Oct. 3	1.75836¢	May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢	July 5	1.83901¢	Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢	Jan. 13	1.86586¢	Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢	Jan. 7	1.97319¢	Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢	May 28	2.26498¢	Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.



Specify NICKEL-CHROMIUM-IRON *Castings*

HEAT RESISTANT ALLOY

Nickel-chromium-iron heat resistant castings are now available from the producing foundries, without priorities or restrictions. Castings are made in conformity with the Alloy Casting Institute designations with specified Nickel contents ranging up to 68% and chromium up to 32%. This wide range of composition has been designed to meet varied requirements and to help overcome the particular temperature, corrosion and mechanical problems encountered in your furnacing operations.

Ability to: (1) *Resist corrosion* and (2) retain a *high degree of strength at high temperatures* has led to the wide adoption of these cast alloys for industrial furnace parts operating at temperatures exceeding 1200° F.

Take advantage of the substantial economies that are being achieved by heat resistant alloy castings. Minimize shut-downs, repairs and replacements by utilizing the experience of alloy casting producers in selecting the correct alloy type to meet your specific needs. Sources of supply will be furnished on request.

EMBLEM OF INCO SERVICE

TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the application, fabrication, treatment and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes and other alloys containing Nickel. This information and data are yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

Iron and Steel Prices...

Steel prices shown here are f.o.b basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25c above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. (8) Also shafting. For quantities of 20,000 lb to 89,999 lb. (9) Carload lot in manufacturing trade. (10) This base price for annealed, bright finish wire, commercial spring wire. (11) Boxed. (12) Produced to dimensional tolerances in AISI Manual Sec. 6 (13) Delivered San Francisco only: Includes 3 pct freight tax. (14) Delivered Kaiser Co. prices; includes 3 pct freight tax. (15) 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Some producers are charging 2.75c. (17) Delivered Los Angeles; add ½c per 100 lb for San Francisco. (18) Delivered Los Angeles only. (19) Fabricated.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		San Francisco, Los Angeles, Seattle	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($35.00 f. o. b. mill)														
Carbon, forging	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00								
Alloy	$52.00						Canton—$52.00)								
BILLETS, BLOOMS, SLABS							(Provo—$53.20)								
Carbon, rerolling	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00					$45.00		
Carbon, forging billets	$50.00	$50.00	$50.00	$50.00	$50.00	(Provo—$61.20, Duluth—$52.00[13]) $50.00							$53.00		
Alloy	$61.00	$61.00				$61.00	(Bethlehem, Massillon, Canton—$61.00)						$64.00		
SHEET BARS							$53.00		Portsmouth, Ohio—$67.20						
PIPE SKELP	2.35¢	2.35¢					2.35¢	2.35¢	(Coatesville—2.35¢)						
WIRE RODS	2.55¢	2.55¢		2.55¢	2.55¢	(Worcester—2.65¢)						3.27¢[13]			
SHEETS															
Hot-rolled	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.875¢	2.50¢		3.24¢[17]	2.65¢	2.79¢	2.70¢
Cold-rolled [1]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	3.20¢		3.30¢				3.35¢	3.61¢	3.58¢
Galvanized (10 gage)	3.55¢	3.55¢	3.55¢		3.55¢		3.55¢	3.55¢	3.65¢			4.32¢[17]		3.84¢	3.75¢
Enameling (12 gage)	3.55¢	3.55¢	3.55¢	3.55¢			3.55¢		3.65¢				3.70¢	3.95¢	3.93¢
Long ternes [2] (10 gage)	3.55¢	3.55¢	3.55¢											3.95¢	3.91¢
STRIP															
Hot-rolled [3]	2.50¢	2.50¢	2.50¢	2.50¢[15]	2.50¢		2.50¢						2.65¢	2.93¢	2.88¢
Cold-rolled [4]	3.20¢	3.30¢		3.20¢			3.20¢			(Worcester—3.40¢)			3.35¢	3.61¢	3.58¢
Cooperage stock	2.80¢	2.80¢			2.80¢		2.80¢							3.09¢	
TINPLATE															
Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85		(Warren, Ohio—$5.75)		$6.157	$6.062[11]	
Electro, box { 0.25 lb.	Deduct 90¢ from standard coke base box price.														
Electro, box { 0.50 lb.	Deduct 70¢ from standard coke base box price.														
Electro, box { 0.75 lb.	Deduct 50¢ from standard coke base box price.														
BLACKPLATE, 29 gage [5]	3.60¢	3.60¢	3.60¢		3.70¢			3.78¢	3.70¢		(Warren, Ohio—$5.75)		3.99¢	3.90¢	
BLACKPLATE, CANMAKING															
55 lb. to 70 lb.	Deduct $1.55 from standard coke base box.														
75 lb. to 95 lb.	Deduct $1.65 from standard coke base box.														
100 lb. to 118 lb.	Deduct $1.55 from standard coke base box.														
TERNES, MFG., Special coated	Deduct 85¢ from standard coke base box price.														
BARS															
Carbon steel	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢					3.285¢	2.75¢	3.01¢	2.98¢
Rail steel [6, 19]	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢									
Reinforcing (billet) [7]	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢				2.985¢		2.74¢	2.65¢
Reinforcing (rail) [7, 16]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢								
Cold-finished [8]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢							3.35¢	3.61¢	3.58¢
Alloy, hot-rolled	3.05¢	3.05¢				3.05¢	3.05¢	(Bethlehem, Massillon, Canton—3.05¢)					3.20¢		3.19¢
Alloy, cold-drawn	3.80¢	3.80¢	3.80¢	3.80¢		3.80¢							3.95¢		
PLATE								(Coatesville, Claymont—2.80¢, Geneva, Utah—2.80¢)							
Carbon steel [12]	2.65¢	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢	2.65¢				3.46¢[14]		2.87¢	2.85¢
Floor plates	3.90¢	3.90¢												4.30¢	4.28¢
Alloy	3.79¢	3.79¢			(Coatesville—4.10¢)									4.01¢	3.895¢
SHAPES, Structural	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢	(Geneva, Utah—2.65¢) (Bethlehem—2.50¢)					3.17¢[18]		2.70¢	2.64¢
SPRING STEEL, C-R															
0.26 to 0.40 carbon	3.20¢			3.20¢			(Worcester—3.40¢)								
0.41 to 0.60 carbon	4.70¢			4.70¢			(Worcester—4.90¢)								
0.61 to 0.80 carbon	5.30¢			5.30¢			(Worcester—5.50¢)								
0.81 to 1.00 carbon	6.80¢			6.80¢			(Worcester—7.00¢)								
Over 1.00 carbon	9.10¢			9.10¢			(Worcester—9.30¢)								
MANUFACTURERS' WIRE [9]															
Bright [10]	3.30¢	3.30¢		3.30¢	3.30¢		(Worcester—3.40¢, Duluth—3.35¢)					5.63¢[13]		3.71¢	3.68¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.25¢	4.25¢		4.25¢		(Worcester—4.35¢, Duluth—4.50¢)				(Trenton—4.50¢)		5.24¢[13]		4.68¢	4.595¢
PILING, Steel sheet	3.00¢	3.00¢				3.00¢								3.41¢	3.38¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	24.67	17.01	17.47	20.89	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.89	25.29
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt.	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J. Phila., Ft. Wayne	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton, (4 to 6 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	Cr	V	Mo		Base per lb
18	4	1	—	.....	74¢
1.5	4	1.5	8	.....	59¢
6	4	2	6	.....	63¢
High-carbon-chromium*				.....	47¢
Oil hardening manganese*				.....	26¢
Special carbon*				.....	24¢
Extra carbon*				.....	20¢
Regular carbon*				.....	16¢

Warehouse prices on and east of Mississippi are 2¢ per lb. higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.20¢
Armature	4.50¢
Electrical	5.00¢
Motor	5.75¢
Dynamo	6.45¢
Transformer 72	6.95¢
Transformer 65	7.65¢
Transformer 58	8.35¢
Transformer 52	9.15¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	$2.50
Angle splice bars, 100 lb	3.00
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$2.85
Light rails (from rail steel), f.o.b. Williamsport, Pa.	2.95

	Base per lb
Cut spikes	4.50¢
Screw spikes	6.40¢
Tie plate, steel	2.80¢
Tie plates, Pacific Coast	2.95¢
Track bolts	6.50¢
Track bolts, heat treated, to rail roads	6.75¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, add 25¢.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$6.75	$13.50

CLAD STEEL

Base prices, cents per pound

Stainless-clad	Plate	Sheet
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	*24.00	*22.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad 10 pct, f.o.b. Coatesville	30.00	....
Monel-clad 10 pct, f.o.b. Coatesville	29.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg	Delivered San Francisco
Standard, galvanized and coated nails	$3.75†	$4.83
Cut nails, carloads, Pittsburgh base	5.30	....

†10¢ additional at Cleveland, 30¢ at Worcester.

	Base per 100 lb	
Annealed fence wire	$3.95‡	$4.96
Annealed galv. fence wire	4.40‡	5.41

‡10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

	Base column	
Woven wire fence*	84	107
Fence posts, carloads	90††	...
Single loop bale ties	86	110
Galvanized barbed wire**	94	114
Twisted barbless wire	94	...

* 15½ gage and heavier. ** On 80-rod spools in carload quantities. †† Pittsburgh, Duluth.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Alde-cor	Carten	Double Strength No. 1	Dyn-alloy	HI Steel	Mayari R	Otis-coloy	Yoloy	Y-50	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	American Rolling Mill	Great Lakes Steel
Plates	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	....	4.10
Sheets										
Hot-rolled	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	....	3.75
Cold-rolled	4.75	4.75	4.75	....	4.75	4.75	4.75	4.75	5.225*	4.55
Galvanized	....	5.40	....	....	....	5.40	....	....	....	....
Strip										
Hot-rolled	3.85	3.85	3.85	....	3.85	3.85	3.85	3.85	....	3.75
Cold-rolled	....	....	4.75	....	....	4.75	4.75	4.75	5.00*	4.55†
Shapes	....	3.85	....	....	3.85	3.85	3.85	3.85	....	....
Beams	....	3.85	....	....	....	3.85	....	....	....	....
Bars										
Hot-rolled	4.00	4.00	4.00	....	....	4.00	4.00	4.00	....	4.00
Cold-rolled	....	....	....	....	....	....	....	4.60	....	....
Bar shapes	....	4.00	....	....	4.00	4.00	4.00	4.00	....	....

* 21 gage and lighter. † Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts. F.ob. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only

Base price, $200.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
⅛-in.	55½	41
¼-in.	58½	45
1 to 3-in.	60½	47½
Wrought Iron, buttweld		
⅛ in.	2	+20
¼ in.	11½	+10
1 and 1¼-in.	17	+ 2
1½-in.	23½	1½
2-in.	23	2
Steel, lapweld		
2-in.	53	39½
2½ and 3-in.	56	42½
3½ to 6-in.	58	44½
Steel, seamless		
2-in.	52	38½
2½ and 3-in.	55	41½
3½ to 6-in.	57	43½
Wrought Iron, lapweld		
2-in.	14½	+ 5½
2½ to 3½-in.	17	+ 1½
4-in.	21	4
4½ to 8-in.	19	2½

Extra Strong, plain ends

Steel, buttweld		
⅛-in.	54½	41½
¼-in.	58½	45½
1 to 3-in.	60	48
Wrought Iron, buttweld		
⅛-in.	6½	+14
¼-in.	12½	+ 8
1 to 2-in.	22	2
Steel, lapweld		
2-in.	52	39½
2½ and 3-in.	56	43½
3½ to 6-in.	59½	47
Steel, seamless		
2-in.	51	38½
2½ and 3-in.	55	42½
3½ to 6-in.	58½	46
Wrought Iron, lapweld		
2-in.	17½	+ 2
2½ to 4-in.	36	8½
4½ to 6-in.	32	4

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

O.D. in.	Gage BWG	Seamless Hot-Rolled	Seamless Cold-Drawn	Electric Weld Hot-Rolled	Electric Weld Cold-Drawn
2	13	$15.29	$18.17	$15.00	$17.95
2½	12	20.57	24.43	20.11	24.07
3	12	22.87	27.18	22.26	26.68
3½	11	28.86	34.30	28.06	33.64
4	10	35.82	42.55	34.78	41.68

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in. del'd Chicago	$81.56
6-in. to 24-in. del'd New York	79.80
6-in. to 24-in., Birmingham	71.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less	95.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	55
Over 6 in.	45
9/16 & ⅝ in. x 6 in. & shorter	52
9/16 through 1 in. x over 6 in.	48
⅞ & 1 in. x in. and shorter	51
¾ in. x 6 in. & shorter	49
1⅛ in. and larger, all lengths	48
Lag, all diam over 6 in. long	48
Lag, all diam x 6 in. & shorter	50
Plow bolts	57

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	48
9/16 to 1 in. inclusive	47
1⅛ to 1½ in. inclusive	45
1⅝ in. and larger	44

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts

Base discount less case lots

	U.S.S.	S.A.E.
7/16 in. and smaller	..	51
½ in. and smaller	48	..
½ in. through 1 in.	..	48
9/16 in. through 1 in.	47	..
1⅛ in. through 1½ in.	45	46
1⅝ in. and larger	44	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

	Consumer
Packages, nuts separate	60 and 10
In bulk	74

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets (½ in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$5.25
F.o.b. Lebanon, Pa.	5.40

Small Rivets (7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55 and 5

Cap and Set Screws

(In packages)	Percent Off List Consumer
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	56
¾ to 1 in. x 6 in., SAE 1035, heat treated	47
Set screws, cup and oval points	61
Milled studs	33
Flat head cap screws, listed sizes	21
Fillister head cap, listed sizes	40

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$5.95
Old range, non-bessemer	5.80
Mesabi, bessemer	5.70
Mesabi, non-bessemer	5.55
High phosphorus	5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	23¢ to 27¢
Copper, electrolytic, 100 and 325 mesh	30¢ to 31½¢
Copper, reduced, 150 and 200 mesh	29¢ to 30½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe	11¢ to 16¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8.5¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	66¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	25¢ to 31¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	17¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 200 mesh, carlots	23¢ to 26¢
Antimony, 100 mesh	36.05¢
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.025
Lead, 100, 200 & 300 mesh	18.50¢ to 23.50¢
Manganese, minus 325 mesh and coarser	33¢
Nickel, 150 mesh	51½¢
Silicon, 100 mesh	18.15¢
Solder powder, 100 mesh	31½¢ plus metal
Tin, 100 mesh	90¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.90
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb	$2.65
Under 100 lb	$2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$10.00 to $11.00
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	11.00 to 12.00
Foundry, Byproduct	
Chicago, del'd	$16.10
Chicago, f.o.b.	15.10
New England, del'd	17.25
Seaboard, Kearney, N. J., f.o.b.	15.35
Philadelphia, del'd	15.46
Buffalo, del'd	16.14
Ashland, Ohio, f.o.b.	13.35
Painesville, Ohio, f.o.b.	14.60
Erie, del'd	15.75
Cleveland, del'd	15.90
Cincinnati, del'd	15.39
St. Louis, del'd	15.85
Birmingham, del'd	13.25

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads, Per 1000
First quality, Ohio	$64.00
First quality, Pa., Md., Ky., Mo.	70.00
First quality, New Jersey	75.00
Sec. quality, Pa., Md., Ky., Mo.	64.00
Sec. quality, New Jersey	59.00
Sec. quality, Ohio	56.00
Ground fire clay, net ton, bulk	10.00

Silica Brick

Pennsylvania and Birmingham	$70.00
Chicago District	79.00
Silica cement, net ton (Eastern)	12.00
East Chicago	13.00

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$59.00

Magnesite Brick

Standard, Balt. and Chester	$81.00
Chemically bonded, Baltimore	70.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in bulk	$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	24.00
in sacks	28.00
Clinker (dead burned) dolomite, bulk, per net ton, f.o.b. Billmeyer, Pa., Millersville, O.	10.55
Midwest, add 10¢; Mo. Valley, add 20¢	

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		Plates	Standard Structural Shapes	BARS		ALLOY BARS			
	Hot-Rolled (10 gage)	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled			Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.24	$5.18	$5.29	$4.43	$5.28	$4.44	$4.22	$4.48	$5.13	$8.37	$8.37	$9.88	$9.88
New York	4.42	5.17[1]	5.47	4.62	5.40	4.62	4.37	4.62	5.17	8.42	8.42	9.92	9.92
Boston	4.50	5.12[12]	5.55[12]	4.65	6.358	4.70	4.47	4.62	5.22	8.62	8.62	9.97	9.97
Baltimore	4.09	....	5.14	4.40	....	4.39	4.34	4.45	5.35	....	....	....	....
Norfolk	4.35	....	....	....	....	4.50	4.50	4.75	5.50	....	....	....	....
Chicago	3.86	....	....	4.05	5.05	4.25	4.10	4.10	4.75	8.10	8.10	9.35	9.35
Milwaukee	4.199	4.799	5.249	4.199	....	4.499	4.249	4.249	5.149	8.399	8.399	9.649	9.649
Cleveland	4.00	4.60	5.238	4.188	4.85	4.30†	4.311	4.05	4.95	8.358	8.358	9.35	9.35
Buffalo	4.15	4.75[1]	5.35	4.30	5.25	4.55	4.10	4.10	4.75	8.10	8.10	9.35	9.35
Detroit	4.15	4.75	5.42	4.34	5.24	4.59†	4.42	4.20	4.87	8.51	8.51	9.74	9.74
Cincinnati	4.116	4.716	5.168	....	....	4.803	4.444	4.403	5.303	....	....	....	....
St. Louis	4.199	4.799	5.424	4.199	5.424	4.499	4.249	4.249	5.324	8.574	8.574	9.824	9.824
Pittsburgh	4.15	4.65[1]	5.10	4.05	4.95	4.25	4.10	4.10	4.75	8.10	8.10	9.35	9.35
St. Paul	4.384[7]	5.034[1]	5.434[2]	4.404[7]	....	4.684[7]	4.434[7]	4.434[7]	5.728[9]	....	10.084[4]	....	11.728[9]
Duluth	....	....	....	....	....	....	....	....	....	....	....	....	....
Omaha	4.868	6.618[1]	5.918	4.868	....	5.168	4.918	4.918	5.818	....	....	....	....
Indianapolis	....	....	....	....	....	....	....	....	....	....	....	....	....
Birmingham	3.85[11]	....	5.20	4.00[11]	....	4.30[11]	4.05[11]	4.05[11]	5.83	....	....	....	....
Memphis	4.47	....	5.97	4.72	....	4.92	4.67	4.67	5.78	....	....	....	....
New Orleans	*4.46[11]	5.77[1]	....	....	....	4.83[11]	*4.68[11]	*4.78[11]	6.14	....	....	....	....
Los Angeles	5.35	7.00[1]	6.70	5.65	8.35[5]	5.20[13]	5.20[13]	5.10[13]	6.90[14]	9.65[10]	9.35	11.05	11.05
San Francisco	4.90[8]	6.30[9]	6.45	5.20[8]	....	5.00[8]	4.90[8]	4.75[8]	7.00[10]	....	....	....	....
Seattle	5.00	7.80	6.30	5.30[4]	....	5.25[4]	4.95[4]	5.00[4]	7.10	....	....	....	....
Portland	5.00[3]	....	6.25[9]	5.50[3]	....	5.40[3]	5.10[3]	5.10[3]	7.20	....	9.30	....	....
Salt Lake City	6.25	....	7.71	6.50	....	6.10	6.25	6.25	7.50[10]	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 lb and over.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 10,000 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999; (8) 400 lb and over; (9) 450 to 1499; (10) 500 to 999; (11) 400 to 3999; (12) 450 to 8749; (13) 400 to 1999; (14) 1500 and over.

* Add 46¢ for sizes not rolled in Birmingham.

† Up to ¾ in. thick and 90 in. wide.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums.

BASING POINT PRICES						DELIVERED PRICES (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	34.00	34.50	35.00	35.50	.....	Boston	Everett	$0.50 Arb.	29.50	30.00	30.50	31.00	.....
Birdsboro	34.00	34.50	35.00	35.50	39.00	Boston	Birdsboro-Steelton	4.82	.....	.....	.....	.....	43.82
Birmingham	29.38	29.88	.....	.....	.....	Brooklyn	Bethlehem	3.00	37.00	37.50	38.00	38.50	.....
Buffalo	32.50	33.00	33.50	.....	.....	Brooklyn	Birdsboro	3.50	.....	.....	.....	.....	42.50
Chicago	32.50	33.00	33.50	34.00	.....	Cincinnati	Birmingham	4.87	34.25	34.75	.....	.....	.....
Cleveland	32.50	33.00	33.50	.....	.....	Jersey City	Bethlehem	1.84	35.84	36.34	36.84	37.34	.....
Duluth	33.00	33.50	34.00	34.50	.....	Jersey City	Birdsboro	2.33	.....	.....	.....	.....	41.33
Erie	32.50	33.00	33.50	34.00	.....	Los Angeles	Provo	5.94	38.94	39.44	.....	.....	.....
Everett	29.00	29.50	30.00	30.50	.....	Mansfield	Cleveland-Toledo	2.33	34.83	35.33	35.83	36.33	.....
Granite City	32.50	33.50	33.50	.....	.....	Philadelphia	Swedeland	1.01	36.01	36.51	37.01	37.51	.....
Neville Island	33.00	33.50	33.50	34.00	.....	Philadelphia	Birdsboro	1.46	.....	.....	.....	.....	40.46
Provo	33.00	33.50	.....	.....	.....	San Francisco	Provo	5.94	38.94	39.44	.....	.....	.....
Sharpsville	33.00	33.50	33.50	34.00	.....	Seattle	Provo	5.94	38.94	39.44	.....	.....	.....
Steelton	34.00	.....	.....	.....	39.00	St. Louis	Granite City	0.75 Arb.	33.25	34.25	34.25	.....	.....
Struthers, Ohio	33.50	.....	.....	.....	.....								
Swedeland	35.00	35.50	36.00	36.50	.....								
Toledo	32.50	33.00	33.50	34.00	.....								
Troy, N. Y.	34.00	34.50	35.00	35.50	39.00								
Youngstown	33.00	33.50	33.50	34.00	.....								

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 88¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$40.50; f.o.b. Buffalo—$41.75. Add $1.00 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorous $40.50 per gross ton, f.o.b. Lyles, Tenn. Delivered to Chicago, $45.99. High phosphorous charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	157.00
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	7.00	7.25	7.80
Ton lots	8.00	8.60	10.50
Less ton lots	8.40	9.00	10.90

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$43.00	$44.00
F.o.b. Pittsburgh	47.00	48.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30
L.c.l. lots	32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.06% max. C, 0.06% P, 90% Mn	21.00	22.10	22.70
0.10% max. C	20.50	21.60	22.20
0.15% max. C	20.00	21.10	21.70
0.30% max. C	19.50	20.60	21.20
0.50% max. C	19.00	20.10	20.70
0.75% max. C, 7.00% max. Si	16.00	17.10	17.70

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.65
Ton lots	7.70
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	6.75
Ton lots	7.75
Less ton lots	8.15

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $68.00 f.o.b. Keokuk, Iowa; $65.75 f.o.b. Jackson, Ohio; $67.00 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	15.60	17.85	19.60
97% Si, 1% Fe	16.00	18.25	20.00

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	4.25	4.50	4.70
Ton lots	5.25	5.85	6.15
Less ton lots	5.65	6.25	6.55

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	11.65	...	...
50% Si	7.80	8.30	8.50
75% Si	10.00	10.30	11.05
80-90% Si	11.30	11.60	12.35
90-95% Si	12.80	13.10	13.80

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.75	22.15	22.25
0.50% C	21.50	21.90	22.00
1.00% C	21.00	21.40	21.50
2.00% C	20.50	20.90	21.00
65-69% Cr, 4-9% C	15.60	16.00	16.15
62-66% Cr. 4-6% C. 6-9% Si.	16.60	17.00	17.15

Briquets — contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	9.85	10.10	10.20
Ton lots	10.75	11.65	12.25
Less ton lots	11.15	12.05	12.65

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chrominum contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	16.70	17.10	17.25
Ton lots	17.90	19.20	20.00
Less ton lots	18.60	19.90	20.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	21.00	21.40	21.50
Ton lots	22.35	23.00	24.20
Less ton lots	23.35	24.00	25.20

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed, 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	14.00	14.50	16.55
Ton lots	16.10	16.85	19.00
Less ton lots	17.10	17.85	20.00

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	17.60	18.45	20.20
Less ton lots	18.60	19.45	21.20

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.60	$2.35	$2.95
Less ton lots	1.95	2.70	3.75

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	16.00	17.10	19.05
Less ton lots	16.75	17.85	19.80

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	14.25	15.35	17.30
Less ton lots	15.00	16.10	18.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained W, 5 ton lots, freight allowed	$2.25
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5	$1.10
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb	
Ton lots	$2.50
Les ton lots	$2.55
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo	80¢
Ferrotitanium, 40-45%, 0.10%C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10%C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$142.50
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., $3 unitage per gross ton	$65.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy. Carload lots	17.00¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy Carload, bulk	5.50¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload	6.25¢
Ton lots	6.75¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	9.00¢
Ton lots	9.75¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.

Carload lots	35¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	87.5¢
No. 6	60¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Carbortam, f.o.b., Suspension Bridge, N.Y., freight allowed. Ti 15—17%, B 0.90—1.15%, Si 2.5—3.0%, Al 1.0—2.0%.

Ton lots. per pound	8.0¢

Man Made Lighting Will Increase Airport Safety During Fogs

Cleveland

• • • **A new all-weather** airport approach lighting system that is visible through 1000 ft of the thickest fog, when objects 50 ft away cannot be seen in daytime, has been developed by Westinghouse Electric Corp.

Preliminary tests at the Cleveland Municipal airport indicate that the bad weather problem of disrupted schedules and endangered lives and planes can be largely eliminated at airports where this new system is installed. These tests showed that transition from instrument approach to visual landings can be accomplished easily under any condition of fog.

The tremendous range of candlepower is said to permit approaches to be made during any kind of weather, day or night, so that full instrument procedure becomes routine and bad weather introduces no new problems.

The Cleveland tests represented only 8 pct of a full approach light installation and the first full system will be installed at New York City's Idlewild Airport within 8 months.

The system requires no additional equipment on the plane and works equally well with any type of instrument approach system: Instrument Landing System (ILS), Ground Controlled Approach (GCA), or Microwave. It is the first system of lights with enough power to be of use in foggy daytime, and with characteristics that cannot be mistaken for any other type of light. The pilot will continue to locate the airport by radio and align his plane by instruments at the outer marker—a point 2 miles from the end of the runway. There he begins to descend slowly until he reaches the approach portal, an imaginary frame 400 ft high and 700 ft wide with its lower edge 100 ft above the level of the runway surface.

At that point he receives a radio signal indicating that he must leave instruments and search for visual contact. Once the plane enters the approach portal 3500 ft from the end of the runway, the pilot will be able to see the artificial lighting flash produced by the line of brilliant approach lights, regardless of weather conditions.

System Includes 3.3 Billion Cp Lamps Visible Through Fog At 1000-ft Altitude

o o o

The all-weather approach light system includes three component parts: Approach lights, runway designator, and runway lights.

Thirty-six Krypton flash units, each with a brilliancy of 3,300,000,000 peak beam cp, are placed in line alternately with 36 neon blaze units for a distance of almost three-quarters of a mile from the approach portal to the start of the runway.

When flashed rapidly one after another, the line of lamps appears like a stroke of lightning traveling toward the airport landing strip. Flashing 40 times a minute, this line of vivid light can be seen for at least 1000 ft even in zero-zero visibility.

In clearer weather, intensity of the approach lights is reduced and the Krypton units can be turned off in favor of the less brilliant neon blaze units that can be used as either flashing or steady-burning lamps. Brilliance of the neon units can be reduced to as little as 100 cp if weather at night is clear.

An 83-ft combination red cross or green arrow serves to direct runway traffic. As the pilot approaches the beginning of the runway, he sees on the ground a brilliant green arrow 83 ft long, indicating that the runway is all clear for his landing. This is called the runway designator. If for some reason the runway is not clear, the designator is changed to a high flashing red cross.

New, powerful runway lights will give the pilot an accurate picture of the runway's width and direction. These high-intensity runway lights are spaced at 200-ft intervals along the runway border. Although 100,000 cp can be used in worst visibility conditions, brightness can be reduced gradually to 5 cp for clear night operation.

This positive means of getting a plane to the ground safely once the pilot has been directed to the airport by radio means will cut accidents 90 pct, by preventing plane crashes now caused by poor visibility in landing, W. A. Pennow, Westinghouse aviation lighting engineer, forecasts. Poor visibility will no longer be reason for canceling or delaying a scheduled flight to airports equipped with these landing aids.

ALL CLEAR—*To direct runway traffic in all-weather approach light system, this type of green arrow is mounted at the head of the landing runway. The one shown is installed at the National Airport, Washington, D. C., but is slightly shorter than the 83-ft arrow planned for the all-weather system. When the runway is not all clear, the control officer in the airport tower can change the arrow to a flashing red cross.*

President of Steel Co. Of Canada Outlines Position of Company

Hamilton

• • • **Facts presented** by H. G. Hilton, President of the Steel Co. of Canada Ltd., at the annual meeting here not only present the picture of his company, but also outlined the situation pertaining to other companies and the steel industry in general. Mr. Hilton stated in part:

"Since the beginning of this year your company's steelmaking capacity has been fully engaged with the exception of a slight temporary curtailment this month due to a shortage of fuel oil. Ingot production has been supplemented by the purchase of substantial tonnages of semifinished steel arranged by the Department of Reconstruction and Supply as part of its plan to assure maximum output from Canadian rolling mills. Sales, both in tonnage and dollar value, were substantially higher in the first quarter of this year than in the corresponding period of 1946, when less purchased steel was available and prices of steel products, for the most part, remained unchanged at prewar levels. As a result, profits for this year to date have shown a welcome improvement compared with the unsatisfactory first quarter results of a year ago.

"The present rate of steel production in Canada is approximately double that of 1937 and 1939. There is, as yet, little indication of a falling-off in the demand of your company's products from the level prevailing since the end of the war. There are signs, however, that the construction industry which is an important consumer of iron and steel, is faced with the deferment of new projects and extensions by reason of the present high cost of building. Shortages of various kinds continue to plague your management in its efforts to maintain maximum production in order to support the position of steel consumers. Of these, the shortage of scrap, common to all of North America, is probably the most serious—in fact, lack of scrap may conceivably force a curtailment of steel production during the coming year.

"Since the annual report for 1946 was published, your company has sold on favorable terms a $20 million issue of 20-year debentures bearing interest at 2¾ pct per annum. The proceeds will be used for the general corporate purposes of the company, which include the completion of extensions and improvements now under construction."

Carbon 14 Employed In Metallurgical Studies

Pittsburgh

• • • **Just as medical** scientists are using radioactive tracers to study functions of living organisms, scientists at the Westinghouse research laboratories are following the progress of radioactive atoms through the internal structure of metals.

In the photo below James K. Stanley, Westinghouse research engineer, counts the high-speed particles as they shoot out from a small sample of metal which has been injected with a dose of radioactive carbon. Migration of the carbon is followed through the metal by means of a Geiger counter and by periodic exposure to a photographic plate which fogs up when bombarded by electrons.

Such migration of carbon is believed to be one reason why steel ages and becomes brittle. The sample of radioactive material is nserted into the Geiger counter. As particles fly off the carbon, they activate an electric circuit that is amplified by the large receiver in the background so that a distinct bark is heard over a loudspeaker.

Reports German Iron Ore Mine Production Fell Sharply in 1946

Paris

• • • **According to the** Swiss newspaper, *Neue Zurcher Zeitung*, the German iron ore mines, whose capacity was estimated at 17 million to 19 million tons before the war, produced in 1946 only 3,807,000 tons with a 793,896 ton Fe content. A summary of previous output is included in the accompanying table. The rate of production in the mines, which averaged 60 pct to 65 pct before the war and 80 pct in 1943, fell to 18 pct of the capacity last year.

The iron content is said to have decreased from an average of 30 pct to 25 pct in 1946. With 793,000 tons Fe content, the home production covered 30 pct of the consumption of the blast furnaces because there were still foreign ore stocks of high grade. If a level of 11 to 13 million tons of steel was to be authorized, compared with a production of 3,530,000 tons last year and an authorized production of 6,380,000 tons (under the present agreement), imports of high grade foreign ores seem likely.

The cost of iron ore mining is said to have increased, and the state subsidy of 4 Rm per ton has been suspended (the Rm is worth about two puffs off a cigarette). The mines are said to be working at a loss. Many iron ore mines in south Germany and Siegerland are closed. The main production center is Salzgitter with about 2,640,000 tons (660,000 tons Fe content), that is 70 pct of total production.

Though much scrap could be recuperated, the scrap supply is said to be short, because of the increase of the charge in blast furnaces to compensate for poor iron ores, lack of equipment and transport for scrap collecting, and exports of scrap to Britain.

PRODUCTION OF IRON ORE IN GERMANY

(In thousands of net tons)

	Crude Ores	Ores for Blast Furnaces	Fe Content
1938	13,083	12,183	3,511
1943	16,467	14,384	4,212
1946	3,807	2,892	794

Inco Will Spend About $8 Million This Year On Its Oxide Sinter Plant

Toronto

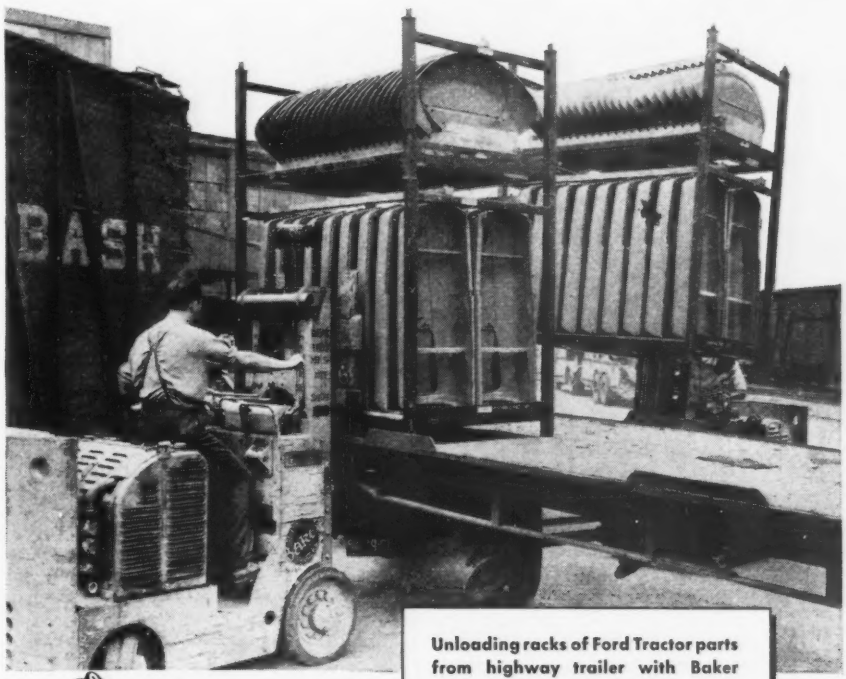
• • • **International Nickel Co.** of Canada made capital expenditures in 1946 of $3,775,509, and the 1947 outlay will be approximately $10 million, R. C. Stanley, president, stated at the annual meeting here late last month. The increase is due largely to an outlay of about $8 million for completing the plant to manufacture nickel oxide sinter, he said. He also intimated that the removal of duties on copper and nickel imposed by the United States would cheapen nickel to American consumers.

"For the greater part of the year nickel production was about 50 pct of capacity," Mr. Stanley reported, "but during the final quarter output was raised to over 75 pct of capacity. . . Sales of nickel in all forms amounted to 201,103,234 lb compared with 201,572,987 lb in 1945, about equal to the maximum sales in the pre-war years. The geographical distribution of our nickel has changed greatly. Russia, formerly one of our important markets, has not been taking our nickel since the end of 1945, and is developing the Petsamo nickel mine. . . Sales in the United States and in many smaller countries have increased.

"There is a strong world demand for copper and the company is endeavoring to renew its export trade with former customers in the United Kingdom and on the continent. Our refined copper sales in 1946 were 149,777,060 lb comparable to 215,723,220 lb in 1945. The major portion of our export copper sales are being made under contract with the U. K. Ministry of Supply and these for 1947 now cover 75 pct of our exportable production. . .

"The total of our world sales of mill and foundry products in 1946 was 70,528,539 lb as compared with a yearly average of 69,721,798 lb during the war period. A plant for the manufacture of precision castings has been completed in Bayonne and operations have started."

BAKER TRUCKS
help lower Production Cost — of Ford Tractors



Unloading racks of Ford Tractor parts from highway trailer with Baker Fork Trucks. Trucks tier these racks in convenient storage areas and transport them to assembly lines.

The essential relation between "mass production" and "engineered material handling" is effectively demonstrated at Ford's huge Highland Park, Mich., tractor plant. Here modern mechanized handling facilities consisting of hoists, roller conveyors, sliding ways and a fleet of Fork Trucks, keep materials moving in a highly integrated, efficient flow pattern reducing handling costs to a minimum.

Wherever possible, parts and materials are handled on pallets. Incoming shipments not palletized by suppliers are usually palletized upon arrival — and the ultimate aim is to have all suppliers ship on pallets. Certain parts, such as tractor fenders, arrive nested on tierable racks (see illustration). Besides cutting costs by eliminating individual piece-by-piece handling, this "unit load" system permits tiering to conserve storage space.

Baker Material Handling Engineers are prepared to recommend similar cost saving methods for your plant.

Member: Electric Industrial Truck Association

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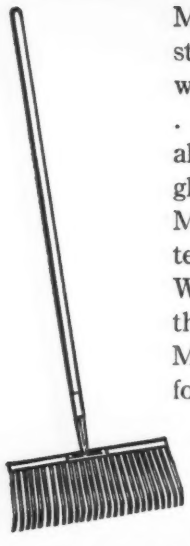
Baker INDUSTRIAL TRUCKS

Moksnes lawn rakes are light, well balanced and strong . . . built to speed the raking job and save work. The special curved teeth are self-cleaning . . . simply reverse the rake, drag toward you, and all leaves and twigs fall off. The springy wire teeth glide over rough spots, eliminating tug and pull. Made of resilient high carbon Keystone wire, the teeth hold their shape throughout years of hard use. We are proud that special Keystone wire delivers the flexibility, springiness, and toughness needed in Moksnes rakes . . . another important individual use for Keystone industrial wire.

*Moksnes Manufacturing Co., Whitewater, Wisconsin



Flat tooth rake with flexible teeth made of Keystone wire

KEYSTONE MUSIC SPRING WIRE

SPECIAL ANALYSIS WIRE for all industrial purposes

KEYSTONE STEEL & WIRE COMPANY
PEORIA 7, ILLINOIS

Says Foundry Industry Now Offers Engineers A Challenging Future

Madison, Wis.

• • • **"For the first time** in industrial history, the foundry industry is offering the graduate engineer a challenging future," said Richard S. Falk, assistant to the president of the Falk Corp., Milwaukee, in a talk before the engineering students at the University of Wisconsin.

Mr. Falk said that experiences in World War II had revolutionized the foundry industry and had paved the way for the arrival of technically trained men in foundry management. Many unfavorable working conditions have been eliminated by foundry employers since the participation of women workers during the war, he said.

"Methods and knowledge accumulated in the war have virtually opened a new field to the engineering graduate," Mr. Falk said. "The foundry industry now has a specialized spot for him. Every spring will find an increasing number of foundrymen visiting the university campuses in search of well qualified engineering graduates. The engineer who chooses the foundry has chosen for the seriously under-manned himself a future."

Lehigh Leases Foundry

Washington

• • • **Lehigh Foundries,** Inc., has leased for 10 years the government-owned foundry at Easton, Pa., it operated during the war. The WAA lease calls for $6.50 per ton of castings production with a minimum guarantee of $50,000 a year. It also carries an option to buy the facilities at the plant, with certain exceptions, for $624,000.

Built at a cost of $1,451,667, the building contains machine tools, presses, milling machines, grinders, lathes, electrical melting furnaces, electrical annealing furnaces, sand handling equipment, rotoclones, air compressors, ovens, three cranes, and laboratory and testing equipment.

Lehigh expects to spend $246,000 to reconvert the plant for production of malleable and gray iron castings to be used for washing machines, compressor housings and wheel cylinders.

HARPER fastening NEWS

"SEEING EYES" for SEA-DROMES

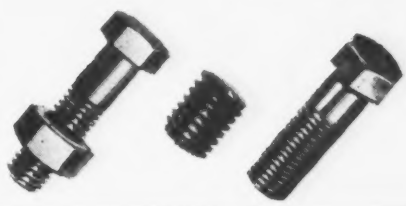
Utilize Harper Silicon Bronze Bolts

At a time when safety in commercial flying has become a primary consideration to airlines, government and the flying public a well-known manufacturer of lighting equipment has come forward with a clever solution to at least one of the pressing problems —sea-drome landings at night. Lighting of water areas is difficult particularly in connection with aircraft takeoffs and landings where the judgment of altitudes and depths is of paramount importance. Water surfaces are ever changing from glassy smoothness to heavy chop, preventing consistent lighting from above.

Hence the development of these underwater flood lights which are

anchored about eight feet beneath the surface of the water and present to the incoming pilot a clear, non-glare landing path unaffected by the condition of the water surface, yet the light is of such character that he can detect that condition and make due allowances.

Harper Silicon Bronze Bolts which are strong, durable and resist sea water corrosion are specified in these Navy-approved units.



POWER UNIT SUBMERGES IN UNIQUE DEEPWELL PUMP

One of the most efficient pumps yet devised for deepwell water supplies, dewatering and other similar uses is a submersible turbine type produced by a large western manufacturer. It is designed on the principles of the first deepwell turbines but ingeniously contrives to carry its power source under water with the pumping unit. This overcomes the drawback of the older type receiving its power from the surface through a whirling shaft which cannot follow the contours of an offset well and is limited in depth of operation.

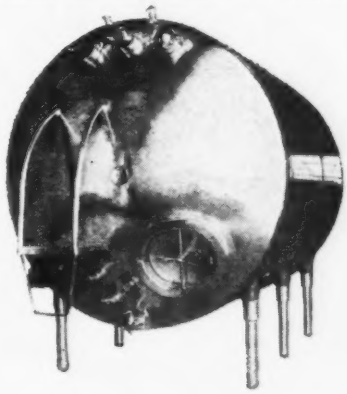
The "Submersible" motor is completely sealed in a steel case and close-coupled to the turbine pump. A minimum of surface housing is required.

Common metal fastenings originally employed in this unit proved unsatisfactory against corrosive fluids. Later, this problem was solved by the installation of Harper Stainless Steel bolts.

STAINLESS A "MUST" IN MILK HOLDING TANKS

Rigid rules of sanitation set down for the dairy industry require that all surfaces which come into contact with milk be faultlessly free from bacteria-breeding flaws. Materials which corrode to produce pitted surfaces or contours which prevent thorough cleansing cannot be tolerated.

Through exhaustive tests Type 302 stainless steel has been found an excellent material for fabrication of the carefully designed tanks such as the milk holding tank illustrated here. It resists corrosion by lactic acid, offers high strength and takes a smooth, clean polish. Manufacture of 302 stainless studs, set screws and hexhead bolts used in this tank, however, is difficult and requires special know how and equipment . . . the knowledge and facilities which are "stock in trade" at the H. M. Harper Company.



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ECLIPSE

Begin Negotiations To Settle War Claims

Washington

• • • **State Dept. officials** have revealed that the Chinese and American governments will shortly begin negotiations to settle lend-lease, surplus property transfers, and other financial claims rising out of the war.

War aid to China consisted roughly of a total of $2 billion, of which about $1.5 billion was extended under lend-lease and a loan of $500 million in 1942. Since VJ-Day, approximately $900 million (procurement cost) worth of surplus property has been transferred to China for an agreed sales price of $210 million.

It was admitted that the final terms would reflect "the same liberal settlement principles" which have governed similar settlements with other countries. These represent usually a return of about 10¢ on the dollar.

Industrial Equipment Sale

Washington

• • • **Within the next** few weeks, WAA will launch three national sales of surplus industrial power equipment, held by its various regional offices. It includes solderless connectors, soldering lugs, junction and outlet boxes and flexible metallic tubing and conduits. The solderless connectors and soldering lugs to be disposed of originally cost the government nearly $2 million. About $1 million worth of flexible metallic tubing and conduits, in used and unused condition, will be available in coils, boxes and crates. Also to be offered for sale are approximately 1.5 million junction and outlet boxes and box covers, section switch boxes and floor boxes.

Approves New Addition

Washington

• • • **Completion of a** $435,000 addition to the railway switch and frog plant of the American Brake Shoe Co., Niagara Falls, N. Y., has been approved by the Facilities Review Committee of the Office of the Housing Administrator. Completion of the plant was approved by reason of its products being deemed in critical short supply.

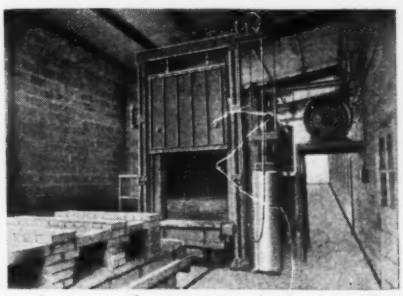
R-S Furnace Facts

FOR THOSE CONCERNED WITH QUALITY HEATING OF METALS

"Both Ends Against the Middle"

In heat treating high alloy castings at 2100° F, the Cooper Alloy Foundry Company, Hillside, N. J., saves fuel, floor-space and time through R-S furnace design here pictured.

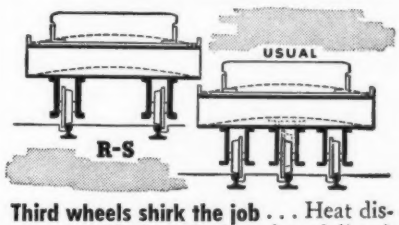
R-S provides doors at both ends of the furnace, and two car hearths. Thus, while one car is in the furnace and the charge is being heated, the other car is unloaded and reloaded, so that no time is lost between heats.



As a result (1) the fuel normally required to hold an empty furnace at heat while the charge is made ready is saved; (2) a smaller furnace produces more tonnage per day; and (3) furnace life is increased because less violent heat-and-cool cycle goes on in the furnace chamber. "Playing both ends against the middle," say R-S designers, "is desirable in the foundry."

A rotary hearth in Detroit
Had holes in the wall like a quoit.
Said a fellow named Schmaltz,
At avoiding such faults
R-S engineers are adroit.

R-S builds for the years, with the thought that every dollar saved in Maintenance is a direct addition to Profits. Considering that M = 3P (AISE figures) throughout the steel industry, you're on the right course when you specify R-S furnaces.



Third wheels shirk the job . . . Heat distorts a wide hearth (see dotted lines) so third wheels lift, and overload the others. The R-S solution is to design for ample "beef" so that *two* will do the job right.

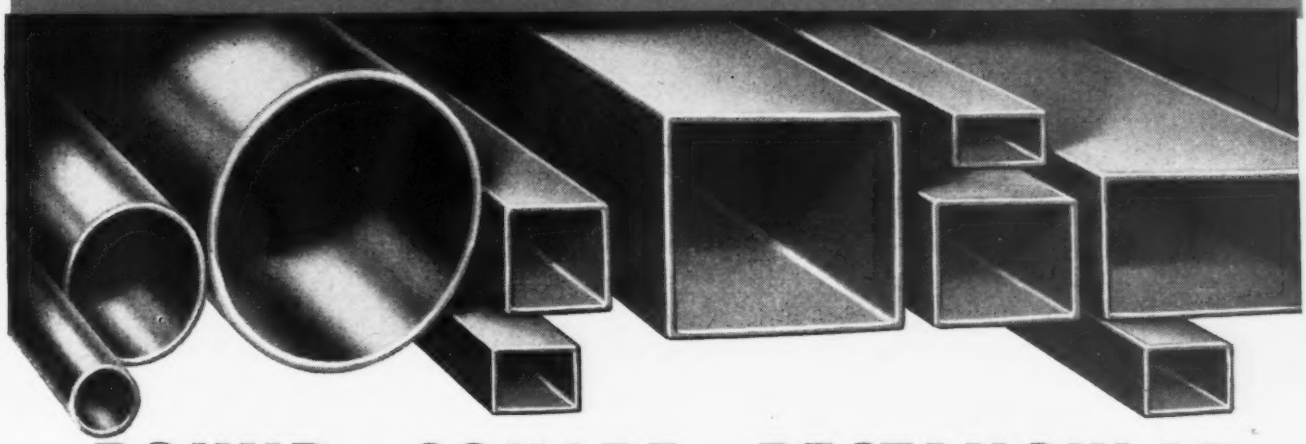
JMLCO P-E1

FURNACE DIVISION
R-S Products Corp.
PHILADELPHIA 44, PA.

Michigan

WELDED STEEL TUBING

The Modern Electric Resistance Welded Steel Tube



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9 to 22 gauge

½" to 2" 20 gauge
1" to 2¾" 14, 16, 18 gauge

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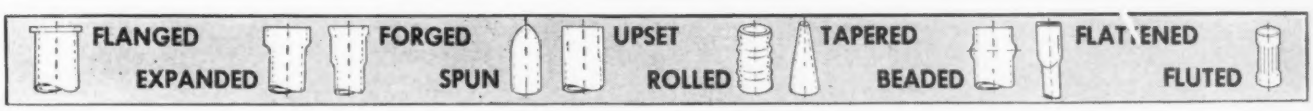

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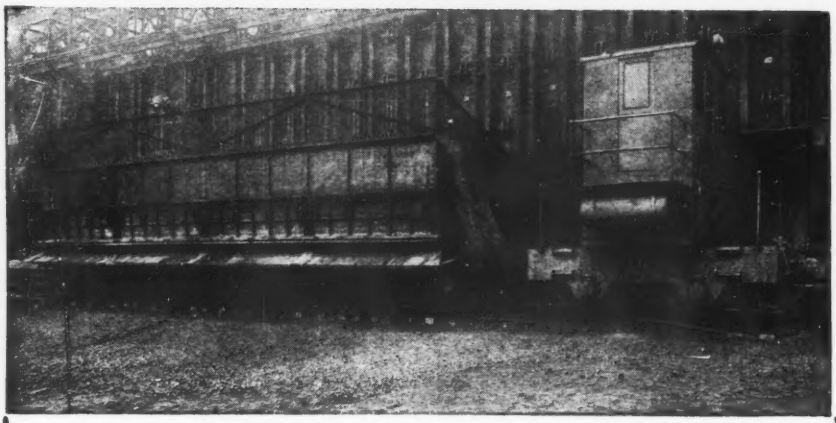
COKE OVEN EQUIPMENT



QUENCHING CARS AND LOCOMOTIVES

All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

Other ATLAS Products

Ore Transfer Cars
•
Scale Charging Cars
•
Electrically Operated Cars for Every Haulage Purpose

Locomotives for Switching and Interplant Haulage
•
Turntables

The ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1100 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

Canadian March Iron Output 164,403 Tons; Daily Average Declines

Toronto

• • • **Canadian pig iron** production for the month of March showed a gain of 13,771 tons over the previous month, but the daily average was down one pct. For March pig iron output amounted to 164,403 net tons, or 70.5 pct of rated capacity, and compares with 150,632 tons in February when the average was 71.5 pct, and with 142,240 tons in March, 1946, or average of 61 pct of capacity.

Production for March included 136,983 tons of basic iron, of which 129,649 tons were for further use of producing companies and 7334 tons for sale; 14,627 tons of foundry iron, 159 tons for further use and 14,468 tons for sale, and 12,793 tons of malleable iron, all for sale. Charges to blast furnaces in the month under review included 307,847 tons of iron ore, 16,708 tons of mill cinder, scale, sinter, etc., and 5037 tons of scrap iron and steel.

Pig iron output for the first 3 months of this year totaled 492,348 net tons, as compared with 327,945 tons in the 1946 period and 471,273 tons in 1945.

Output of ferroalloys in March was 14,197 net tons against 9357 tons in February and 13,083 tons in March, 1946. Ferroalloys produced in the month under review were as follows: Ferrosilicon, silicomanganese, ferromanganese, ferrochrome, chrom-x and ferrophosphorus. For the first 3 months this year production of ferroalloys totaled 33,198 net tons against 19,001 tons in the 1946 quarter and 41,966 tons in 1945.

Following are comparative monthly production figures for 1947 in net tons:

	Pig iron	Ferroalloys
January	177,313	9,644
February	150,632	9,357
March	164,403	14,197
Total 3 Mos.	492,348	33,198

Quarterly Income, Sales Up

Cleveland

• • • **Cleveland Graphite** Bronze Co. has reported net sales of $8,947,678 in the first quarter of 1947 and net profit of $1,055,823 after all charges and provisions for federal income taxes. Profit is equal, after preferred dividend requirements, to $3.18 a share.

IN RESISTANCE WELDING

why use just one line...

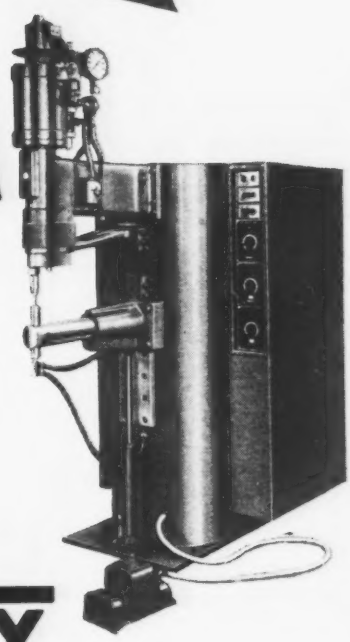
when you can use *three!*

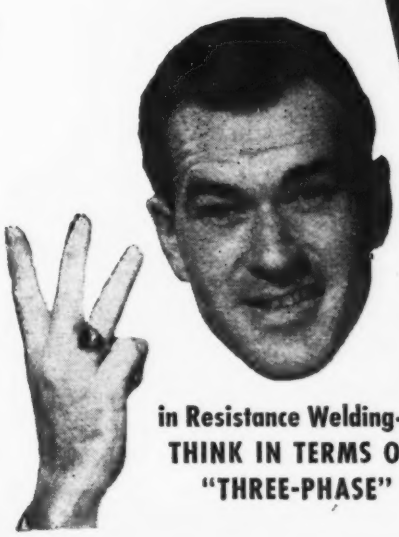
THREE-PHASE

DRAWS BALANCED 3-PHASE LOAD

USES 75% LESS LINE CURRENT

AT NEAR UNITY POWER FACTOR





in Resistance Welding—
THINK IN TERMS OF
"THREE-PHASE"

This Sciaky "Three-Phase" Welder draws a balanced load from all three phases of your supply—requires only 50 amps. to do a 200-amp. job—at better than 80% power factor.

Write Today for Full Details

SCIAKY

SCIAKY BROS., Inc.
4913 W. 67th St., Chicago 38, Ill.

FOR FAST, EASY CUTTING of Sheet Metals

Specify STANLEY

Trade Mark

HARDWARE · HAND TOOLS · ELECTRIC TOOLS

the greatest name in tools

• Included in the line of Stanley Electric Tools are portable and bench type UNISHEARS with capacities of 18, 16, 14, 12 and 8 gauge hot rolled steel, other materials in proportion.

A nearby Stanley Industrial Distributor will supply the right tool for the job.

STANLEY ELECTRIC TOOLS

New Britain, Connecticut

Weekly Gallup Polls

(CONTINUED FROM PAGE 117)

Farmer	57	36	7
Manual workers	37	56	7
Union members	37	57	6

The vote of Democrats and Republicans on the question:

POLITICAL

	Limit to Opportunity to get Ahead	Gov't Should Guarantee Jobs	No Opinion
	Pct	Pct	Pct
Democratic	44	50	6
Republican	60	35	5

Other differences in thinking on the question, by education, sex, and age groups:

EDUCATION

	Limit to Opportunity to get Ahead	Gov't Should Guarantee Jobs	No Opinion
	Pct	Pct	Pct
College	73	24	3
High school	57	39	4
Grammar school or less	40	51	9
SEX			
Men	54	41	5
Women	46	46	8
AGES			
21 to 29	48	46	6
30 to 49	51	43	6
50 & over	48	43	9

The London Economist

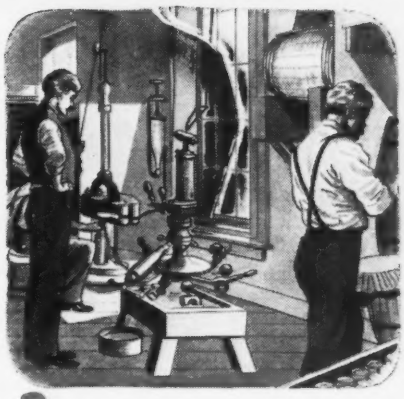
(CONTINUED FROM PAGE 121)

crossing of swords with Congress concerns his hope of restoration, by the Senate, of the $150 million cut the House made in the $350 million foreign relief program.

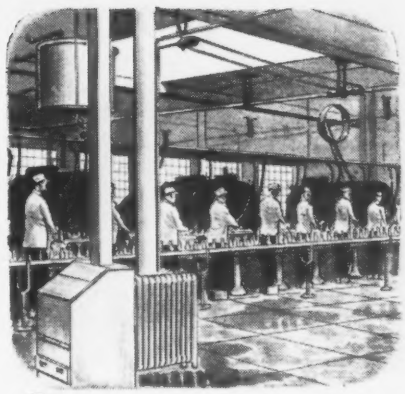
Along with consideration of such costs, go queries whether the money spent and to be spent, if and as applied under the short-term objectives, is being applied in such a way as to give the maximum yield. The *New York Herald Tribune* declares that to "hold Europe for democracy a policy of boldness in generosity is the only practicable course."

Where is the boldness to go with the generosity? When the Greco-

1 **1785** -Townsend Speakman, druggist, at the suggestion of one Dr. Physick, produced an artificially carbonated water for its health value. Soon, fruit juices were added for flavor and the soft drink business was under way in America.



2 **1880**—Bottling machines looked like this. Work was mostly by hand in crude workshops. People went for the new "pop", not only as a beverage, but as a "cure" for gout and many other ailments. New methods were still to come.



3 **1915**—Howell engineers began working with machinery manufacturers to apply industrial type motors, specially designed, for the particular applications in bottling. Soon Howell "Red Band" Motors appeared in this and many other industries.

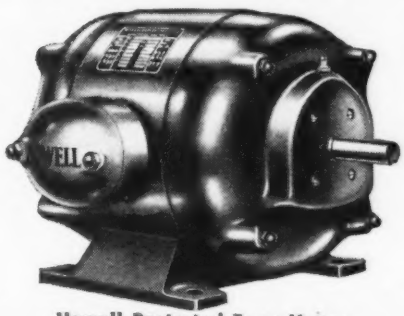
Then, "Pop" became a billion dollar business!

4 **Today**—Soft drinks are as much a vital part of America as the "hot dog" and the "hamburger." More than a billion dollars' worth, each year, is mass-produced under rigid sanitary standards in spotless factories operated by electrical horsepower.

In the Soft Drink Industry you'll find Howell industrial type motors operating bottlers, conveyors, carbonators, cappers and agitators. In many other great American industries, too, you'll find Howell motors powering the machines of production, as well as air conditioning and ventilating equipment. And, best of all, if you ask Howell users, you'll find that Howells are making good on their hard jobs.

Are you using them?

Be wise—buy industrial type Howell Motors! They're designed for the toughest operating conditions in industry; consequently, they perform better on *all jobs!*



Howell Protected Type Motor

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

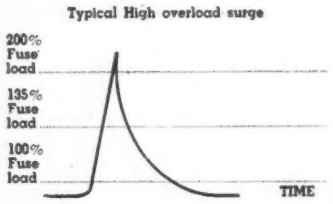
Manufacturers of Quality Industrial Type Motors Since 1915

STOP
UNNECESSARY
FUSE
BLOWING

INSTALL
PIERCE
Balanced Lag
RENEWABLE FUSES

Exclusive Features, developed by Pierce engineers, dissipate heat by:
1. Link Design
2. Screen Ventilation

Typical High overload surge



NOTE: The elapsed time at 200% fuse load is a few seconds, but at 135% load may be many minutes.

Pierce Balanced Lag fuses concentrate additional lag in the safe overload range, from 100% to 200% load, where lag is needed to prevent unnecessary fuse blows.

FREE: Balanced Lag Link to inspect and test. Specify amperage, voltage.

Turkish proposal was laid before Congress, there was general awareness that this was a first installment on a very large order. A good many people wished they could get a look both at the whole bill, and at the design for reconstruction which it could facilitate.

If aid were not to be rushed, country by country, and only after "armed minorities and outside pressures" were already active—if aid were not to be a countermeasure—toward what positive result should it be directed?

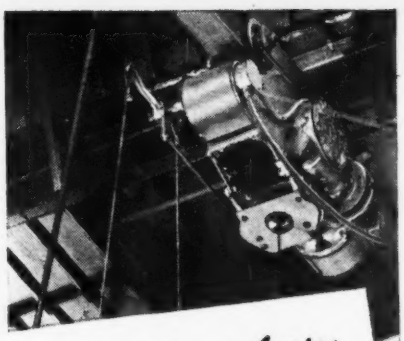
It is quicker to get foods for Europe by rebuilding Germany along the old lines, to become for a third time the dominant industrial area of the continent. But what about the slightly longer run? That Germans will work more on fuller stomachs seems likely; that within any brief period they will also think differently awaits proof. Before the war, Germans had a higher standard of living than any of their neighbors. But did this make the adolescent game of "Follow the Leader" less attractive?

The idea of European federation —economic, political, or both— keeps cropping up. It has appeared in the form of the concurrent resolution introduced on Mar. 20 by Senators Fulbright and Thomas and Congressman Boggs: "That the United States hereby favors the creation of a United States of Europe within the framework of the United Nations," and in the declaration of 81 prominent Americans assembled by Count Coudenhove-Kalergi, and again in President Truman's interview with Mr. George Creel.

The converse of General Eisenhower's comment that "weakness cannot cooperate; it can only beg" is noted in the joint ITO delegation to the Geneva Conference on International Trade of the Netherlands, Belgium and Luxemburg.

The case for making decisions further ahead than the next crisis has been repeatedly urged since the Truman Doctrine was announced. The impression exists that the major positive result of the Moscow meeting is an improved working basis among the Americans, the British and the French.

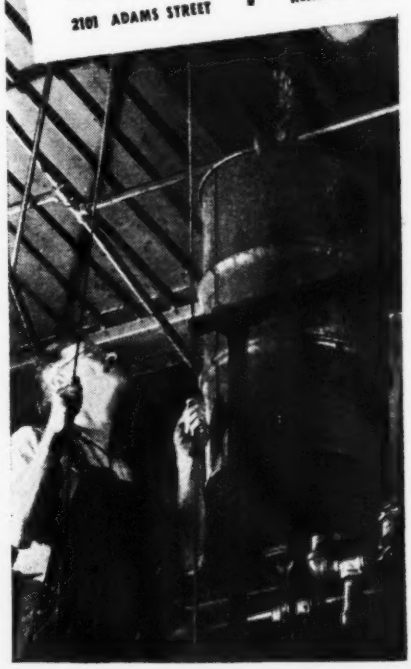
Is it strong enough to support the kind of boldness that would make Europe's 200 million people and 2 million sq miles a balanced and productive economic area?



Modern Hoist Logic:
3-2 = LOWER COSTS!

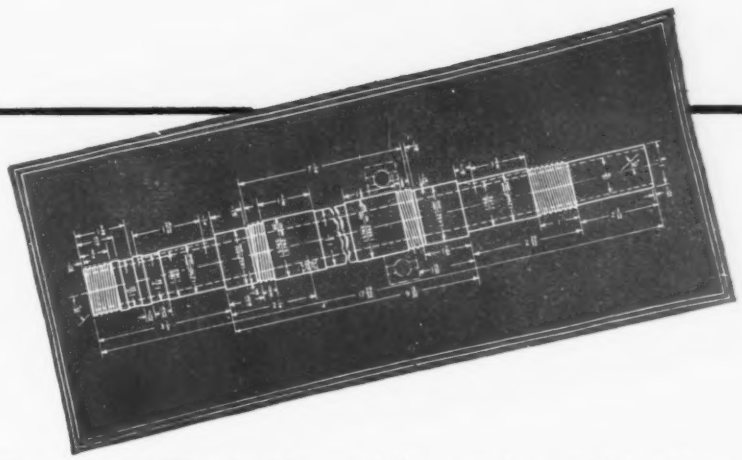
—Yes, rock-bottom handling costs—*and* more output per hour! Here's the record: Heavy drums of chemicals had to be lifted to a raised vat—and lifted fast. The block and tackle formerly used required 3 men to get the proper lift speed. This ½-ton Reading Electric Hoist paid for itself in 2 months by keeping 2 men on their regular jobs and letting the third raise drums alone—in half the previous time! Let a Reading engineer help you get the same kind of handling results with a fast, smooth-working Reading Electric Hoist. Drop us a line today for full details. No obligation, of course.

READING CHAIN & BLOCK CORP.
2101 ADAMS STREET • READING, PA.



READING
HOISTS

The Steel Tube "Headache" that Multiplies Itself



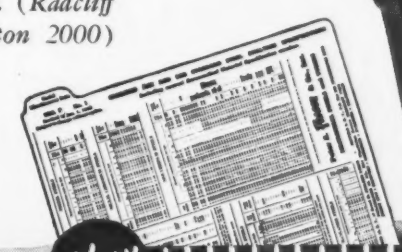
Courtesy Petroleum Heat & Power Co.

TO MAKE this "Petro" oil burner shaft, a seamless steel tube is turned and ground to 17 separate diameters. It's threaded, tapped, chamfered and keywayed—all to close tolerances.

The cost of making this finely balanced shaft (8 times that of the raw material) makes rejection of a finished part highly expensive. Hours of skilled labor might be spent on material later found defective—while the cost headache multiplies with every wasted man hour.

Frasse tubing has been successfully used by the manufacturer in this rigid application for years. If you're interested in cost reducing (and who isn't these days) you'll find tubing of the selfsame quality in any Frasse warehouse.

Frasse stocks include seamless and welded mechanical tubing, aircraft, condenser and pressure tubing, and stainless steel tubing and pipe. Complete range of sizes and grades to choose from—shipment made overnight. Call us. *Peter A. Frasse and Co., Inc., 17 Grand Street, New York 13, N. Y. (Walker 5-2200) • 3911 Wissahickon Avenue, Philadelphia 29, Pa. (Radcliff 5-7100) • 50 Exchange Street, Buffalo 3, N. Y. (Washington 2000) Jersey City • Syracuse • Hartford • Rochester • Baltimore*



New

Latest Frasse Data Chart shows up-to-date analyses specs for all standard steels. Gives AISI number, analyses of each steel and corresponding SAE and AMS numbers. Invaluable to steel users—mail coupon for free copy today.

Peter A. Frasse and Co., Inc.
17 Grand Street, New York 13, N. Y.

Please send me a copy of your latest data chart on standard steel analyses, Sec. F No. 1.

Name: .....

Firm: .....

Address: 32-I

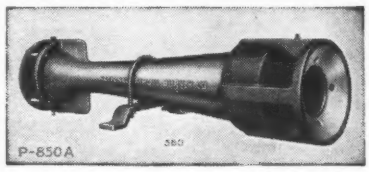
FRASSE *for Steel Tubing*

SEAMLESS AND WELDED
CARBON • ALLOY • STAINLESS

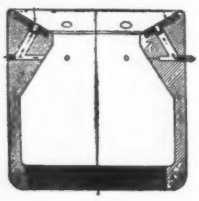
NATIONAL AIROIL FUEL OIL - GAS BURNERS

"AIROCOOL"
GAS BURNER NOZZLES
PATENTED

insure stable ignition over a long, trouble-free life



Recessed facing of refractory insulating plastic protects nozzle from extreme heat and prolongs nozzle life.



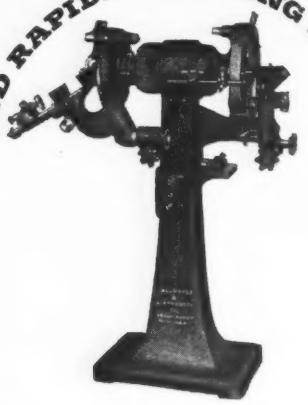
For detailed information about these long-life nozzles, write for Supplement 3 to Bulletin 55.

Renewable type recessed gas tips direct the separate igniter flames against the main volume of the mixture to insure stable ignition; prevent over-heating and burning of castings; and allow greater turndown without burnback.

AIROIL

Main Offices & Factory: 1271 EAST SEDGLEY AVENUE, PHILADELPHIA 34, PA.
Texas Office: 2nd National Bank Bldg., Houston

GRAND RAPIDS GRINDING MACHINES



DELIVER
TOP TOOL ROOM
EFFICIENCY

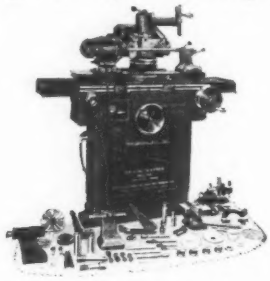
Whether you need a Universal Cutter and Tool Grinder or a Combination Tap and Drill Grinder, you can be sure of top tool room efficiency if they're Grand Rapids by Gallmeyer & Livingston Co.

With the Combination Tap and Drill Grinder you save three ways: 1. First cost, 2. Maintenance expense, 3. Valuable floor space.

Grand Rapids No. 60 Universal Cutter and Tool Grinder handles complex tool grinding jobs with maximum speed and convenience.

Write for bulletins:
GL 8-46 for No. 10-B; 2-28-46 for No. 60

GRAND RAPIDS
GALLMEYER & LIVINGSTON CO.



No. 60 Universal Cutter-Grinder

What "GRAND RAPIDS" Quality Means: Gallmeyer & Livingston cast their close-grained gray iron, machine to micrometric tolerances, precision-assemble grinding machinery of unsurpassed performance. *Grand Rapids* means *top* quality in grinding machinery.
GALLMEYER & LIVINGSTON COMPANY, 200 STRAIGHT ST., S. W., GRAND RAPIDS 4, MICH.

French Enforce Second 5 Pct Price Cut Except For Subsidized Steel

Paris

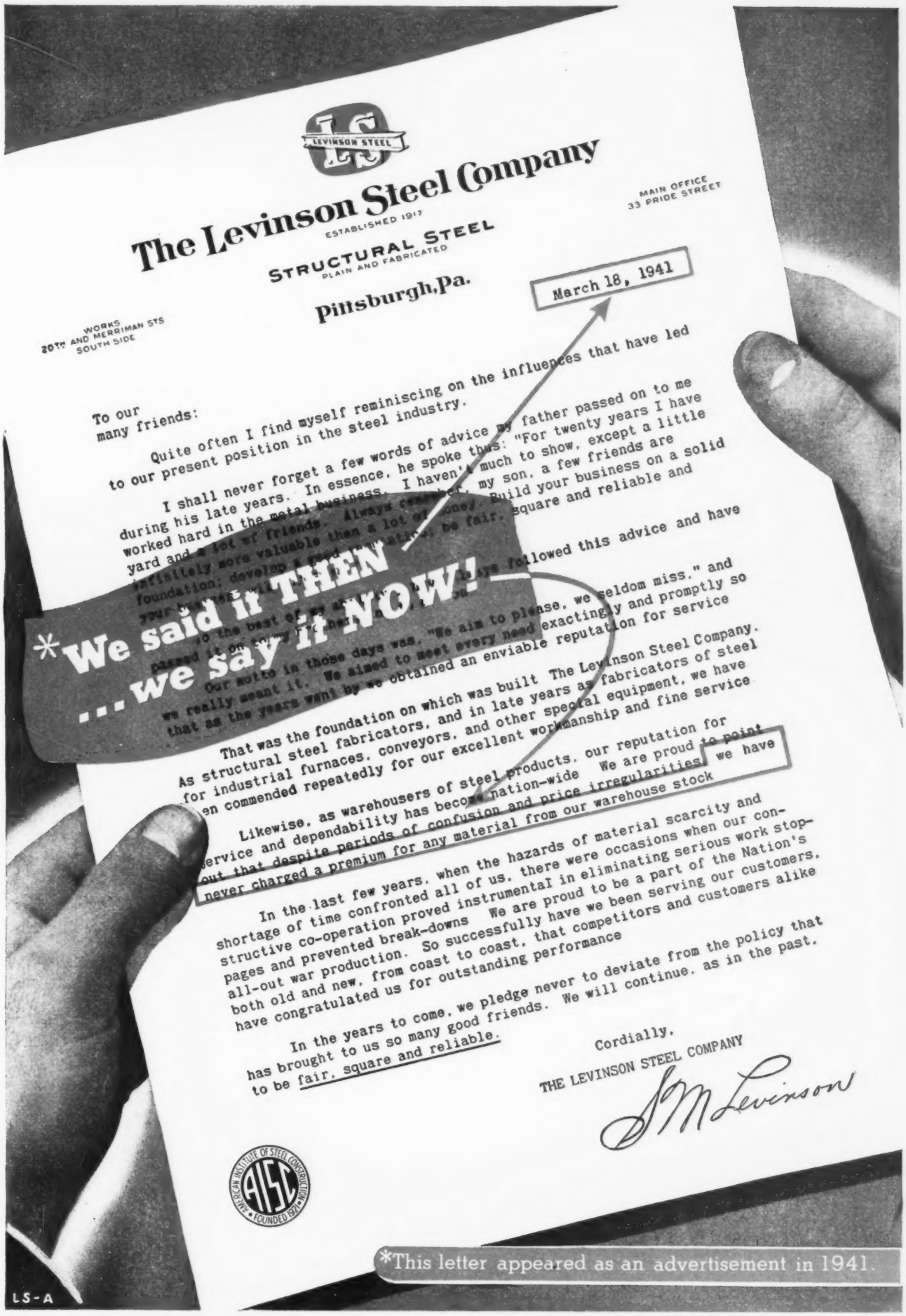
• • • **The initial price cut** of 5 pct enforced by the French Government on all products, except steel which was excluded on account of existing state subsidies, was followed by a second cut of 5 pct designed to bring prices back to a sounder level. Just as some economists noted in the United States that "the critical question was whether the readjustment in the prices' structure was to come mainly through a decline in the prices of those commodities which had risen much more than average, or chiefly through a further rise in those prices that had lagged," so the same problem had to be faced in France although they were somewhat aggravated on account of the low level of production and the difficulties resulting from the war and occupation.

Preliminary statistics on French wholesale prices for March show a definite decrease in agricultural and food prices and industrial price readjustments, making for much sounder relations between the two. The wholesale price index declined from 882 to 851 points during March, but is still above the December level of 842. Industrial products remained stationary at 756, as the increase in the prices of steel products has been compensated by a decrease in the prices of coal and nonferrous products. Food index products fell from 1007 to 945. The cost of living index decreased by 2.4 pct on the February level and by 3.2 pct on that of December last.

The following table shows the movement of the index since November last (based on 100 in 1938):

	Nov.	Dec.	Jan.	Feb.	Mar.
Raw materials ...	736	735	770	771	768
Semifinished products	734	743	742	741	743
Industrial products	735	739	756	756	756
Food products	877	946	978	1007	945
General index	806	842	867	882	851
Cost of living	856	865	856	858	838

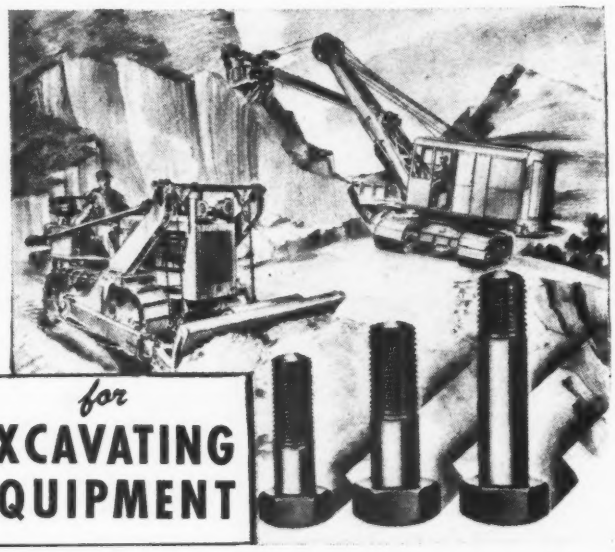
Many firms dealing in luxury goods now find themselves left with stocks bought at excessive unofficial prices. They were relying on a long seller's market, but with the drop in prices the hopes of exporting high-priced goods did not materialize.


The Levinson Steel Company
ESTABLISHED 1917
STRUCTURAL STEEL
PLAIN AND FABRICATED
Pittsburgh, Pa.
MAIN OFFICE
33 PRIDE STREET
WORKS
20TH AND MERRIMAN STS
SOUTH SIDE
March 18, 1941
To our
many friends:
Quite often I find myself reminiscing on the influences that have led to our present position in the steel industry.
I shall never forget a few words of advice my father passed on to me during his late years. In essence, he spoke thus: "For twenty years I have worked hard in the metal business. I haven't much to show, except a little yard and a lot of friends. Always remember, my son, a few friends are infinitely more valuable than a lot of money. Build your business on a solid foundation; develop a good reputation; be fair, square and reliable and
*We said it THEN
...we say it NOW!
That was the foundation on which was built The Levinson Steel Company. As structural steel fabricators, and in late years as fabricators of steel for industrial furnaces, conveyors, and other special equipment, we have been commended repeatedly for our excellent workmanship and fine service
Likewise, as warehousers of steel products, our reputation for service and dependability has become nation-wide We are proud to point out that despite periods of confusion and price irregularities, we have never charged a premium for any material from our warehouse stock
In the last few years, when the hazards of material scarcity and shortage of time confronted all of us, there were occasions when our constructive co-operation proved instrumental in eliminating serious work stoppages and prevented break-downs We are proud to be a part of the Nation's all-out war production. So successfully have we been serving our customers, both old and new, from coast to coast, that competitors and customers alike have congratulated us for outstanding performance
In the years to come, we pledge never to deviate from the policy that has brought to us so many good friends. We will continue, as in the past, to be fair, square and reliable.
Cordially,
THE LEVINSON STEEL COMPANY
S. M. Levinson
AISC
AMERICAN INSTITUTE OF STEEL CONSTRUCTION
FOUNDED 1921
LS-A

*This letter appeared as an advertisement in 1941.

ERIE SPECIAL BOLTING FOR HEAVY MACHINERY

FOR over 30 years ERIE has specialized in the manufacture of *high quality bolting*. We use the very latest equipment for heat treating, machining, grinding and threading. We are certain that we can produce better bolting at a saving to you because we are specialists—send us your bolting specification for our estimate.



for EXCAVATING EQUIPMENT

A DEPENDABLE SOURCE OF HIGH QUALITY BOLTING FOR RAILROADS, REFINERIES, DIESELS, FARM MACHINERY, EXCAVATING EQUIPMENT AND ALL TYPES OF HEAVY MACHINERY.

ERIE BOLT & NUT CO.
ERIE, PA.
STUDS • BOLTS • NUTS ~ ~ ALLOYS • STAINLESS • CARBON • BRONZE

NEW STAINLESS STEEL COMBUSTION CHAMBER INTRODUCED BY DRAVO
PITTSBURGH, PA.: Stainless steel, scientific development which aided the advancement of jet propulsion and turbo-supercharging is now being utilized to provide more efficient and durable combustion chambers in Dravo Counterflo Oil and Gas Fired Heaters. Effective immediately, industrial and commercial
Dravo Heaters
AVAILABLE IMMEDIATELY

In fabricating the combustion chamber of Dravo Heaters from stainless steel, many extra years of highly efficient operation have been added to the life of a direct fired heater that already has proved its worth in thousands of industrial and commercial installations.

Other advantages include: **elimination of refractory with its troublesome maintenance; reduction of overall size and weight of heaters; greater flexibility of application.** For descriptive bulletin CR-516 write Heating Section.

DRAVO CORPORATION
Pittsburgh • Philadelphia • Cleveland • New York • Detroit
Washington • Atlanta • Wilmington

New Anticorrosive Finish Gives 20 Years' Protection

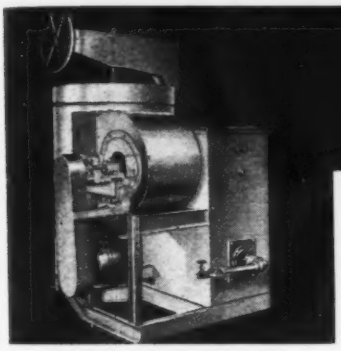
(CONTINUED FROM PAGE 76)

ing, the coating is allowed to dry until a matt finish appears and then heat is applied to bake the coating. Normal baking time is 1 hr at a temperature from 300° to 700°F. If infrared ray lamps are used, the metal is baked in approximately 15 min without an enclosure. Preheating the metal to 150°F before spraying eliminates the drying time and reduces baking time.

Zincilate has a natural gray matt appearance, and it may be polished to a bright silver finish but this soon reverts to the original gray matt unless repolished. The coating can be pigmented or it may be painted or enameled. Life of paint applied over Zincilate on applications such as automobile body sheets and fenders, is said to be greatly increased. It may also be plated for decorative purposes as in the case of automobile bumpers, hardware, trim, carbon steel supports for automobile trim and store window trim. Cost of material per square foot is said to be about one fiftieth of the cost of galvanizing or metal spraying. The complete cost of the treatment to clean the metal, apply the coating and dry it, averages about one fifth the cost of galvanizing or metal spraying.

Applications of Zincilate may be made to steel and iron products in the process of manufacture, as in the case of plates, strips and wire in steel mills, or to castings or forgings in foundries and forging plants. When applied at such a time and after the parts are machined, the exposed portions of the metal are brushed or sprayed to provide a homogeneous coating. As the coating has a reasonable degree of flexibility and metal adherence, it is also said to be possible to coat metals before fabrication involving bending, forming and shaping operations. In ship, bridge, and building construction, the practice of treating structural shapes before fabrication has been followed. If welding is employed during fabrication, only the area adjacent to the weld is treated after cleaning to make a homogeneous coat. As Zincilate will not stand up at temperatures over 600°F or under a high concentration of acids, its use is not recommended for chemical plant equipment and other applications where these conditions are encountered.

Sunbeam STEWART



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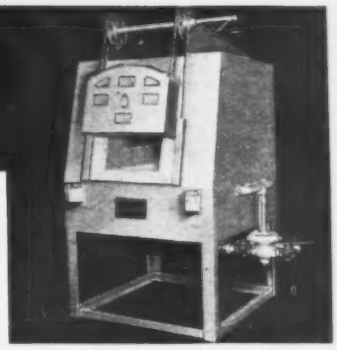
Forging • Carburizing • Case Hardening • Tinning • Normalizing • Brazing • Rod Heating • Lead Hardening • Billet Heating • Oil Tempering • Plate and Angle Heating • Soft Metal Melting • Hardening High Speed Steel • Galvanizing • Stress Relieving • Rivet Heating • Brass Melting • Annealing • Salt Bath Hardening • Cyanide Hardening • Hardening Carbon Steel



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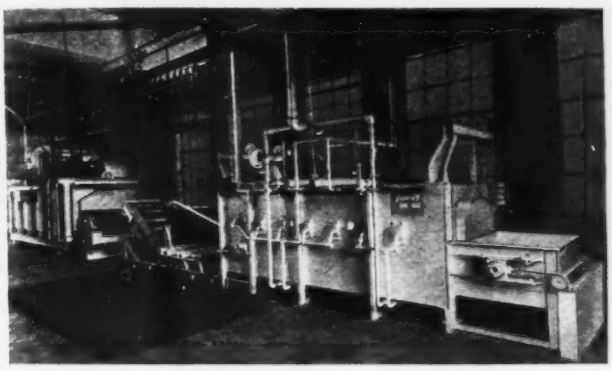

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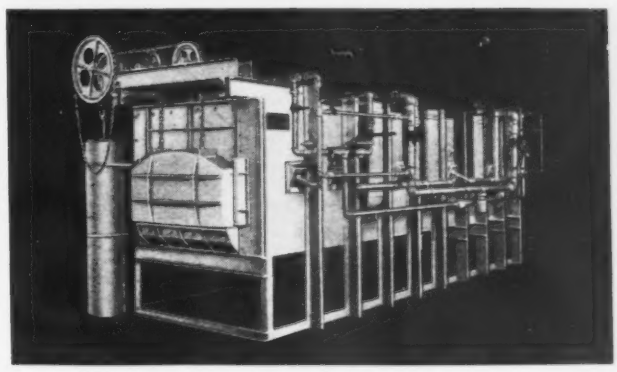

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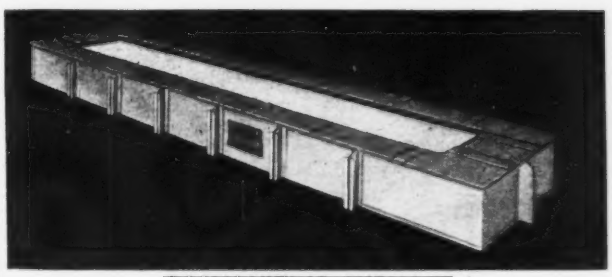

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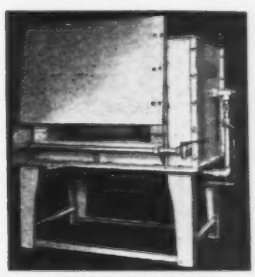

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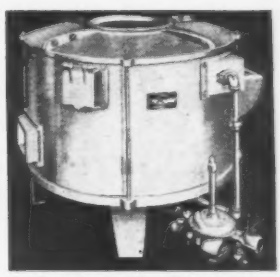

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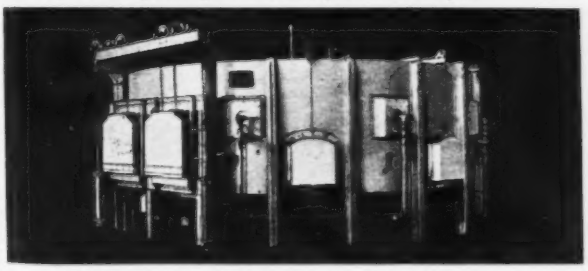

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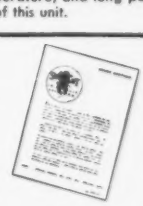
FREE

"Guide to Furnace Selection"



Has the answer to the type of gas or oil-fired furnace best suited for your requirements. Write Sunbeam Stewart Dept. 110 for this handy furnace guide today.

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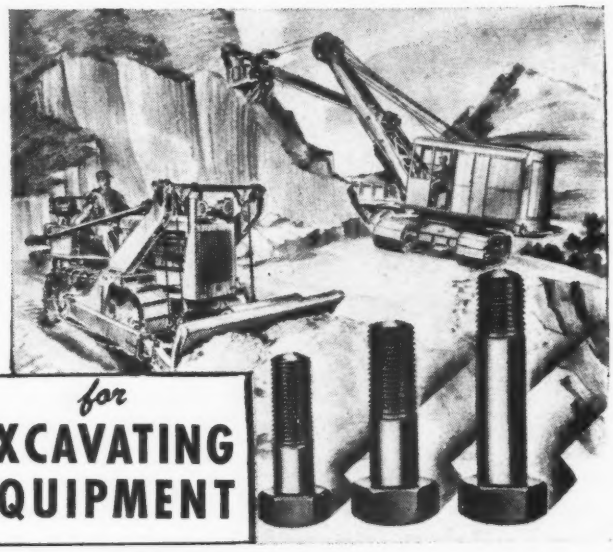
ERIE SPECIAL BOLTING FOR HEAVY MACHINERY

FOR over 30 years ERIE has specialized in the manufacture of *high quality bolting*. We use the very latest equipment for heat treating, machining, grinding and threading. We are certain that we can produce better bolting at a saving to you because we are specialists—send us your bolting specification for our estimate.



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PITTSBURGH, PA.: Stainless steel, scientific development which aided the advancement of jet propulsion and turbo-supercharging is now being utilized to provide more efficient and durable combustion chambers in Dravo Counterflo Oil and Gas Fired Heaters. Effective immediately, industrial and commercial
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Other advantages include: **elimination of refractory with its troublesome maintenance; reduction of overall size and weight of heaters; greater flexibility of application.** For descriptive bulletin CR-516 write Heating Section.

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DRAVO CORPORATION

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New Anticorrosive Finish Gives 20 Years' Protection

(CONTINUED FROM PAGE 76)

ing, the coating is allowed to dry until a matt finish appears and then heat is applied to bake the coating. Normal baking time is 1 hr at a temperature from 300° to 700°F. If infrared ray lamps are used, the metal is baked in approximately 15 min without an enclosure. Preheating the metal to 150°F before spraying eliminates the drying time and reduces baking time.

Zincilate has a natural gray matt appearance, and it may be polished to a bright silver finish but this soon reverts to the original gray matt unless repolished. The coating can be pigmented or it may be painted or enameled. Life of paint applied over Zincilate on applications such as automobile body sheets and fenders, is said to be greatly increased. It may also be plated for decorative purposes as in the case of automobile bumpers, hardware, trim, carbon steel supports for automobile trim and store window trim. Cost of material per square foot is said to be about one fiftieth of the cost of galvanizing or metal spraying. The complete cost of the treatment to clean the metal, apply the coating and dry it, averages about one fifth the cost of galvanizing or metal spraying.

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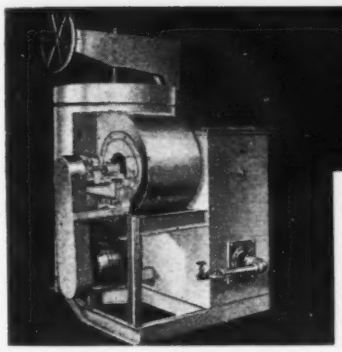

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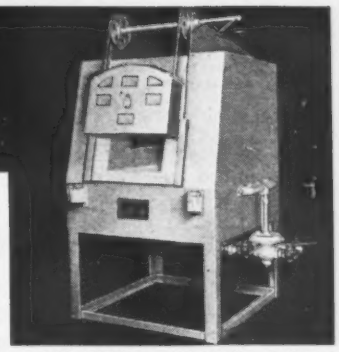

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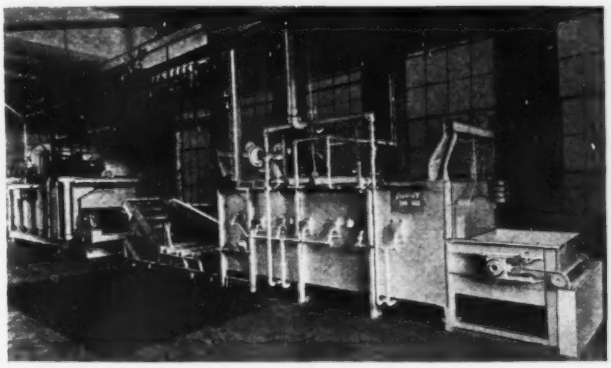

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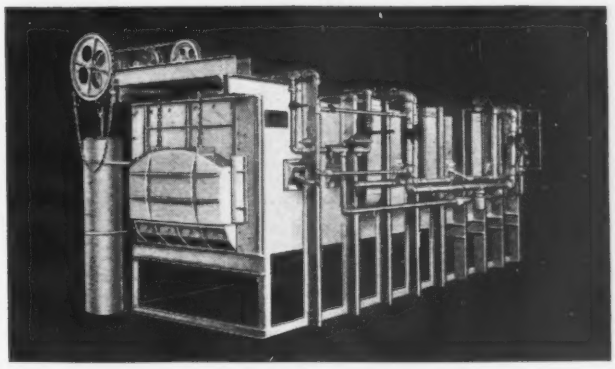

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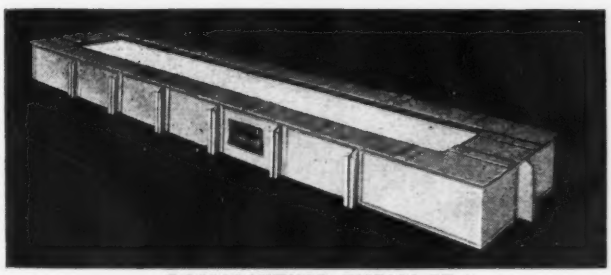

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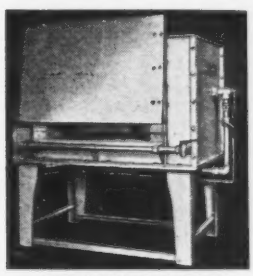

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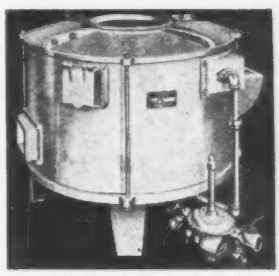

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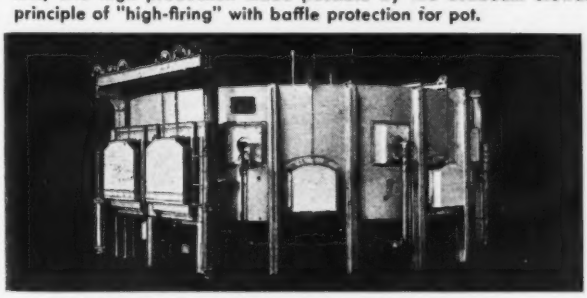

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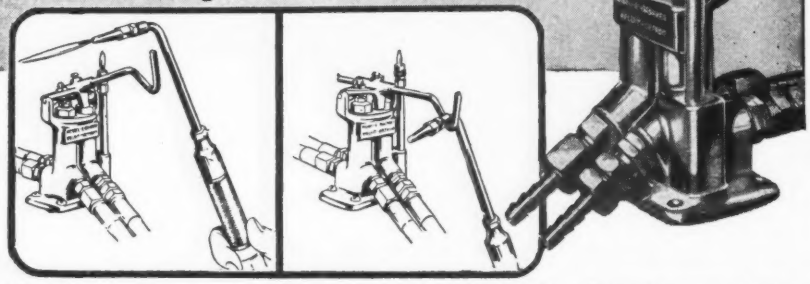
WELDIT GASAVER

● Cuts Gas and Oxygen Cost!
● Eliminates Dangerous Fire Hazard!



With Weldit Gasaver installed the operator simply hangs his torch on the handy lever rod of the Gasaver. The weight of the torch pulls the lever rod down, closing the valves of the Gasaver, thus shutting off both gas and oxygen intake lines. The usual idle flame and needless waste of oxygen and gas between operations is thus eliminated—no fire hazard or danger of injury to workers.

When the torch is again picked up for further welding operations, the operator passes it across the pilot light of the Gasaver, thereby instantly igniting the torch at the pre-adjusted flame, ready for work—no adjustments to make.

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For YOUR special problem, go "HOLE-HOG," write us for any information you may need.

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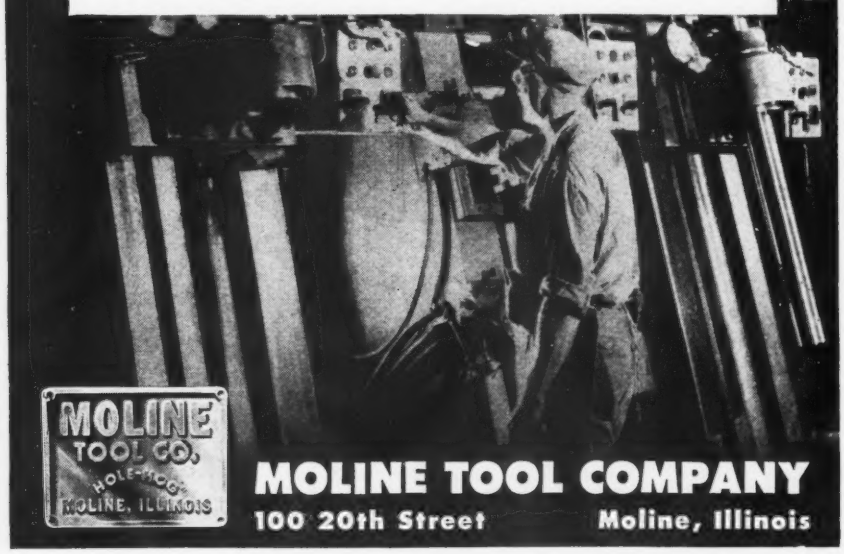

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Industrialists in India And England Plan For Development of India

London

• • • **British and** Indian industrialists are going ahead with their plans for development in India without fear of appreciable difficulty arising from the political changes next year, according to the London *Financial Times.* In fact there is at present considerable activity among firms anxious to take part in accelerated industrialization in India during the next few years.

Far from having a depressing effect on enterprise of this kind, Pandit Nehru's reference to the need for "practical control" of industry is felt to have its encouraging aspects both for investors in new manufacturing concerns and for British equipment exporters.

At present several organizations — either entirely Indian-owned or with financial links with British companies—are planning to manufacture machinery in India. One representative now visiting Europe is preparing for shipment to India of machine tools and other equipment necessary for what is described as one of the most up-to-date engineering works in the world. This buyer is acting on behalf of Indian as well as British and American firms.

The Congress in India has the backing of wealthy and enterprising Indian industrialists who are anxious to support the present official policy. At present the Indian Government encourages commercial activity with the following priority:

(1) Goods wholly manufactured in India wherever possible:

(2) Goods assembled in India partly from imported and partly from Indian-made components;

(3) Goods assembled in India from imported components;

(4) Goods manufactured abroad.

The *Financial Times* says that even a radical economic policy for India would concentrate on items (1) and (2), which might involve control, but would not necessarily imply public ownership or cramping of private enterprise. Only by allowing reasonable freedom for

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MANY Forge Shop operators throughout the country have materially stepped up their forging production both in speed and in quality with the installation of AJAX HIGH SPEED FORGING PRESSES. The ease of operation, made possible by the instantaneous response to the foot treadle, the accessibility of the dies with openings at either side and the back through which the blanks and forgings are passed to conveyors are reasons why these presses are replacing hammers. Then, too, there is the advantage of being able to sink the various forging impressions in individual die blocks, and of holding them securely in alignment, which leads to great economy in die costs.

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DEWART BUILDING NEW LONDON, CONN.

the establishment of new factories and for continued private trading could the new rulers of India retain their support in Congress and the rapid industrialization of India which Pandit Nehru called for.

Industrialists and others in the north in touch with Indian developments do not doubt that the outcome of the sterling balances discussions in May will involve relinquishing British investments in India. They point out that changes in ownership have occurred during the past year or two, and some British-owned factories have changed hands at fantastic prices. One example was a spinning and weaving mill which was sold at a figure equivalent to seven or eight times its 1939 selling price.

Indian industrialists who are willing to pay high prices for British-owned factories secure machinery which could be obtained in the open market only at high prices and with delayed delivery. They evidently appreciate the advantages of equipment in the present sellers' market. Those with selling agencies can for the time being absorb all the output from such factories. They are therefore relying on continued heavy demand for the next 2 years, during which time they hope to pay off a large proportion of capital expenditure. Thereafter they will at least have machinery and premises which can operate on normal returns.

Within the limits set by production difficulties in Britain, exporters are sending all kinds of machinery to India. They stress the gap between output and demand, but are reasonably confident of continued exports of equipment in the years ahead, despite political changes.

Indian industrialists will continue to buy British machinery and will still require certain types —particularly the more intricate and better finished machines or components—even when industrialization is in full swing.

American machinery exports to India are causing some concern because deliveries are so much better than those of British equipment. A typical example is the supply of water meters—American deliveries are reported at present to be on a scale six times that of British firms.

Cut in Appropriations Will Curtail Mineral Research Activities

Washington

• • • **Approval by the** Congress of the House-approved Interior Dept. appropriation bill will result in serious curtailment of government activities in metallurgy, mining and other strategic fields, according to Dr. R. R. Sayers, Director of the Bureau of Mines. Dr. Sayers has told Interior Secretary J. A. Krug that he has alerted his field staff to prepare for closing four large and eight small pilot plants, abandoning or sharply curtailing exploration and research on fissionable and other strategic minerals, and the discontinuation of the other services, including the gathering of statistics on bituminous coal.

As approved by the House, the Interior Dept. Appropriation Bill carried $10,533,875 for the Bureau of Mines, a cut of $6,300,125.

Major plants scheduled for closing July 1, 1947, are the electrolytic manganese pilot plant at Boulder City, Nev.; the bauxite beneficiation mill at Bauxite, Ark.; the rotary kiln sponge iron pilot plant and laboratory at Laramie, Wyo., and the lignite gasification pilot plant at Grand Forks, N. D.

Smaller pilot plants to be abandoned are the tunnel kiln sponge iron and tungsten metallurgy plants at Raleigh, N. C.; zinc dithionate, vanadium, and antimony plants at Salt Lake City, Utah; electrothermic magnesium plant at Pullman, Wash.; pyrometallurgy plant at Boulder City, Nev., and the alumina plant at Rolla, Mo.

In addition, construction will be halted on a zirconium plant at Albany, Ore.; studies will be abandoned on iron ore beneficiation at Tuscaloosa, Ala., and on steel at Raleigh, N. C., and metallurgical research will be drastically curtailed—50 pct in most instances—in remaining plants.

"Domestic mineral exploration

Cooked to order

As you know, a cupola can be charged with materials to produce the type of castings desired — that is, if the metallurgist understands what materials to specify.

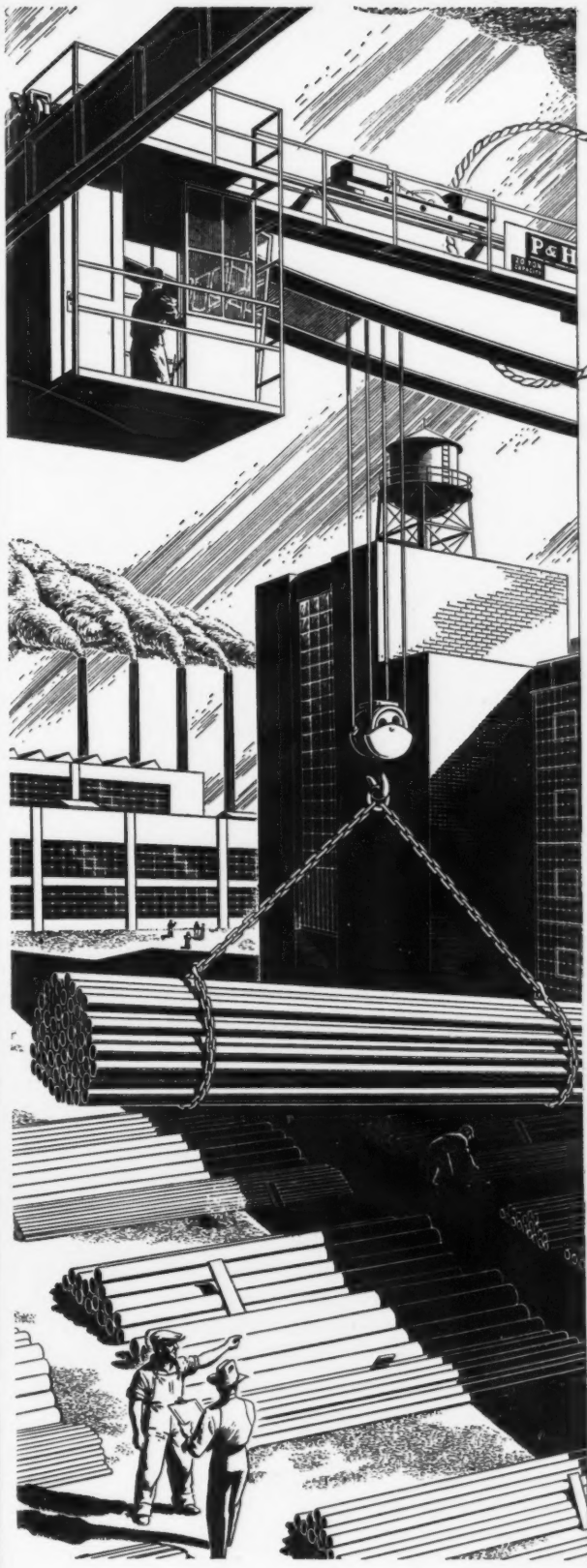
We can give ***Strenes Metal*** a considerable range of characteristics by certain changes in the formula. This affords unusual flexibility in adapting ***Strenes Metal*** castings to the work they are required to do.

So, if you need a special hardening quality in a die, we can give it to you with ***Strenes Metal;*** or we can give you what you need in machinability, or toughness, or any reasonable combination of properties.

This is one of the reasons why more and more manufacturers of metal products are using ***Strenes Metal*** dies. If you're interested, we'll be glad to answer your questions.

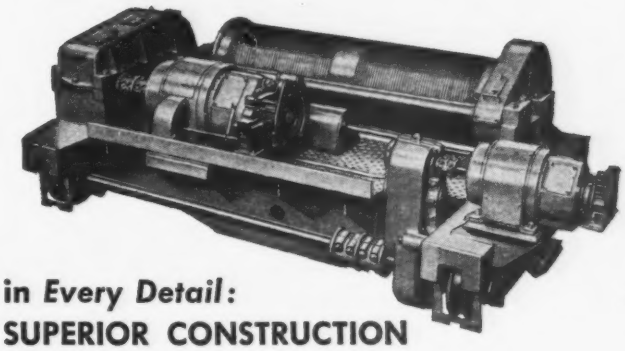
Strenes Metal
DRAWING AND FORMING DIES

THE ADVANCE FOUNDRY COMPANY
100 SEMINARY AVENUE — DAYTON 3, OHIO



All These Added Values

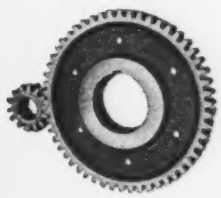
in P&H Heavy-Duty Crane Trolleys!



in *Every Detail:* SUPERIOR CONSTRUCTION

Modern 3-Reduction Unit

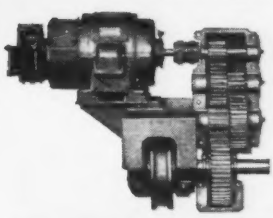
1. Unit gear case, integral with trolley side, mounts first two reductions.
2. Drum gear is enclosed in separate gear case.
3. For AC cranes, a mechanical load brake is mounted on intermediate shaft in gear case.
4. Second electric brake, if desired, can be mounted on motor pinion extension shaft.
5. Trolley sides are box-type construction for maximum lateral and vertical stability.
6. Main girt, also box section, is adequately diaphragmed to prevent roll and twist from swinging loads and welded integral with trolley sides.



Welded Gears

7. Tougher. Pinions and rim stock are high carbon steel.
8. Teeth are generated to precision gauge for quiet, smooth operation.
9. Pinion teeth are treated to 230 Brinell, gear teeth to 190 Brinell — for special requirements, to 500 and 450 Brinell, respectively.

Rotating Axles in MCB Bearing Boxes



10. Axles, wheels and bearings are easily removed.
11. Bearing blocks are solid steel, welded integrally with heavy-section web members and mounted directly to trolley side webs.
12. Roller bearings are used throughout and easily lubricated.

QUIET! P&H Trolleys *are* quiet. Safer, too. Added Values like these — including P&H-built motors and electrical equipment — are an important reason for P&H's continued leadership in the building of overhead cranes.

P&H

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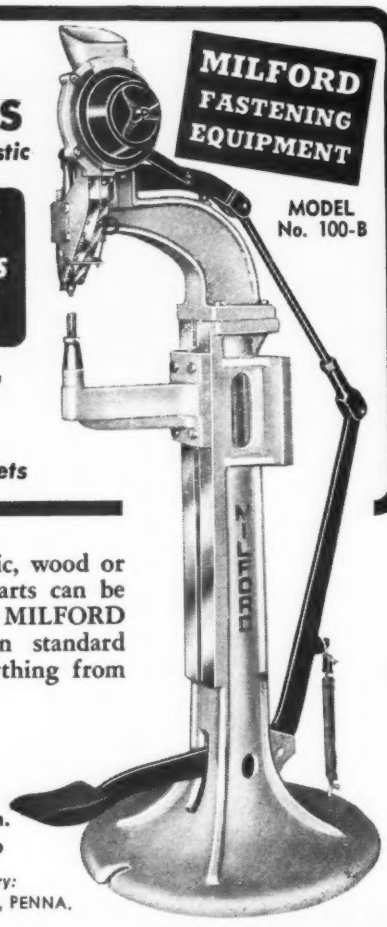

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projects, undertaken after wartime depletion of strategic metals and minerals left the United States in a precarious position, will be curtailed," says Dr. Sayers, "and other similar projects awaiting attention will be abandoned. This will seriously retard any attempt to compile an accurate inventory of mineral resources and prevent carrying out Congressional directives on many phases of the national stockpiling program. The cuts also will largely negate the investigation of radioactive mineral deposits and curb such research on fissionable materials at a time when the potentialities of atomic power for military and peacetime uses are under intensive study throughout the world."

All exploration for coking coal reserves to supply the West's new steel industry must be discontinued, Dr. Sayers reported, including that in Gunnison County, Colo., and other coal exploratory work in North Carolina, Maryland, and Alaska will not be completed. Coal research laboratories at Golden, Colo.; Pittsburgh, Pa.; Tuscaloosa, Ala., and Seattle, Wash., must trim their programs.

Porcelain Enamel Group To Meet in September

Washington

• • • **The ninth annual** forum of the Porcelain Enamel Institute will be held Sept. 10-12, 1947, at Ohio State University, Columbus, Ohio. Official headquarters will be the Deshler-Wallick Hotel, Columbus.

The program this year promises a wide variety of subjects, Edward Mackasek, managing director of the institute said, as certain shop management problems will be on the agenda along with technical and processing papers. The discussion program is being built largely around member-suggested topics, each of which will be handled by an industry authority on the subject.

A large delegation from the British Institute of Vitreous Enamelers is planning an American trip and is expected to attend the forum and visit a number of American porcelain enameling plants.